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NATIONAL DAM SAFETY PROGRAM. BRANT LAKE UPPER DAM (INVENTORY NU--ETC(U)
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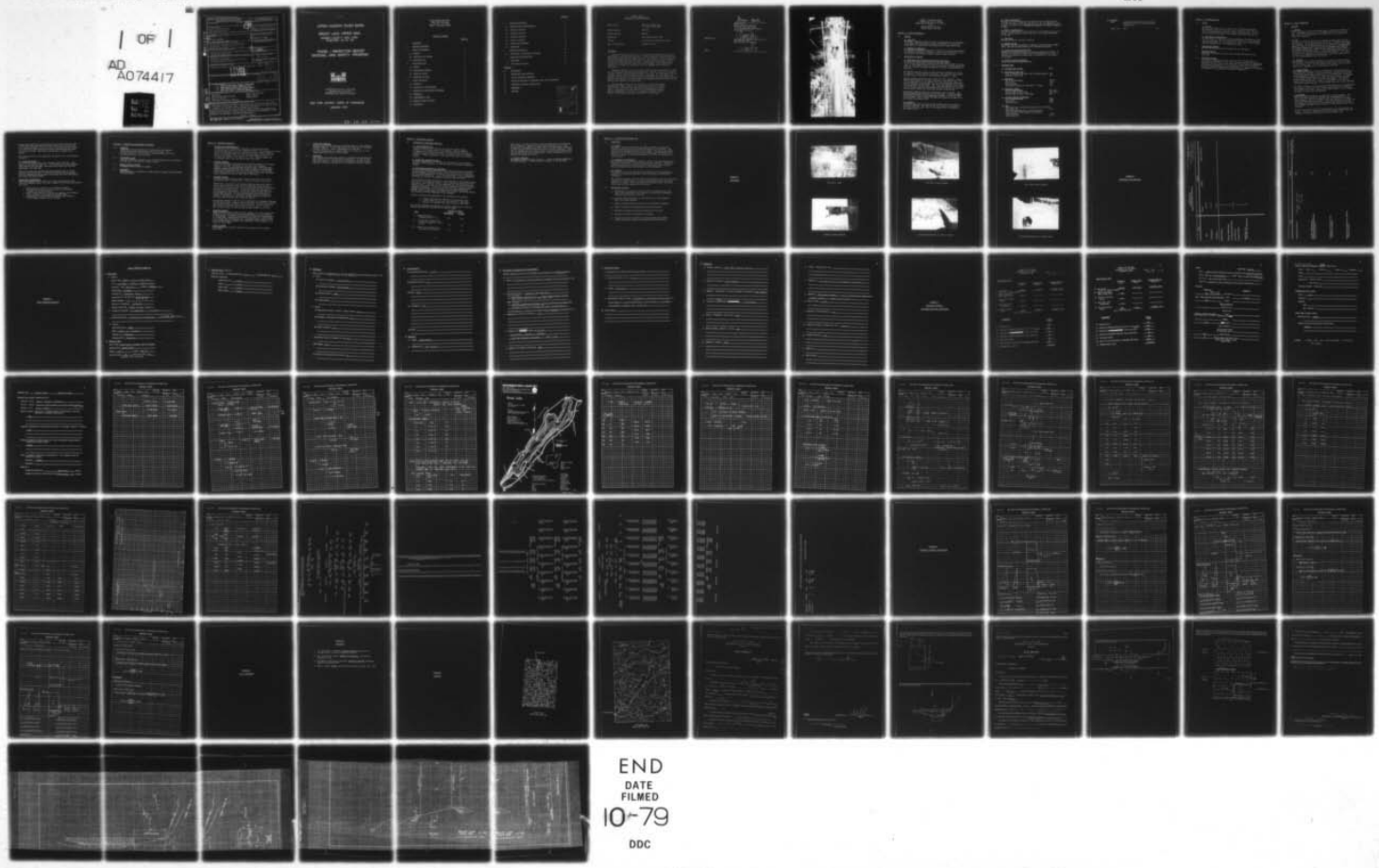

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18. SUPPLEMENTARY NOTES

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19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Dam Safety
National Dam Safety Program
Visual Inspection
Hydrology, Structural Stability
Brant Lake Upper Dam
Warren County
Schroon River

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report provides information and analysis on the physical condition of the dam as of the report date. Information and analysis are based on visual inspection of the dam by the performing organization.

Brant Lake Upper Dam was found to have no serious deficiencies which pose a threat to the structure. Further stability analyses were recommended. Additionally, the spillway is considered inadequate.

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UPPER HUDSON RIVER BASIN

BRANT LAKE UPPER DAM

WARREN COUNTY, NEW YORK
INVENTORY No. NY 158

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

CONTRACT NO. DACW-51-79-C0001

NEW YORK DISTRICT CORPS OF ENGINEERS

JANUARY 1979

UPPER HUDSON RIVER BASIN
BRANT LAKE UPPER DAM
I.D. No. NY - 158 (#652)
PHASE 1 INSPECTION REPORT

TABLE OF CONTENTS

PHASE 1 REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam:	Brant Lake Upper Dam I.D. No. NY-158 (#652)
State Located:	New York
County Located:	Warren
Watershed:	Upper Hudson River Basin
Stream:	A tributary of the Schroon River
Date of Inspection:	October 24, 1978

ASSESSMENT

The Brant Lake Upper Dam is the structure which maintains the level of Brant Lake for recreational purposes. A visual inspection did not reveal any deficiencies which pose a serious threat to the structure. Concrete surfaces on both the highway bridge which crosses the dam and the northeast wingwall are deteriorated and in need of repair. A small scour hole exists on the eastern end of the spillway under the bridge abutment. While these deficiencies do not appear to be serious, they are problems which should be addressed.

Stability analyses for this structure indicate that the factors of safety for all conditions analyzed are unsatisfactory. Further studies are required to better assess the structural integrity of the dam. An investigation of the concrete spillway section should be made to determine the exact limits and dimensions of the concrete and using this information, the structural stability should be reanalyzed. This study should be commenced within six months of the date of final approval of this report.

The spillway capacity is not sufficient to pass the Probable Maximum Flood (PMF). However, the spillway will pass the outflow from 1/2 PMF. Therefore, the spillway is considered to be inadequate. A program of periodic inspection and maintenance should also be established for the dam. In addition, a warning system should be developed and placed in readiness for future use.

George Koch

George Koch
Chief, Dam Safety Section
New York State Department
of Environmental Conservation
NY License No. 45937

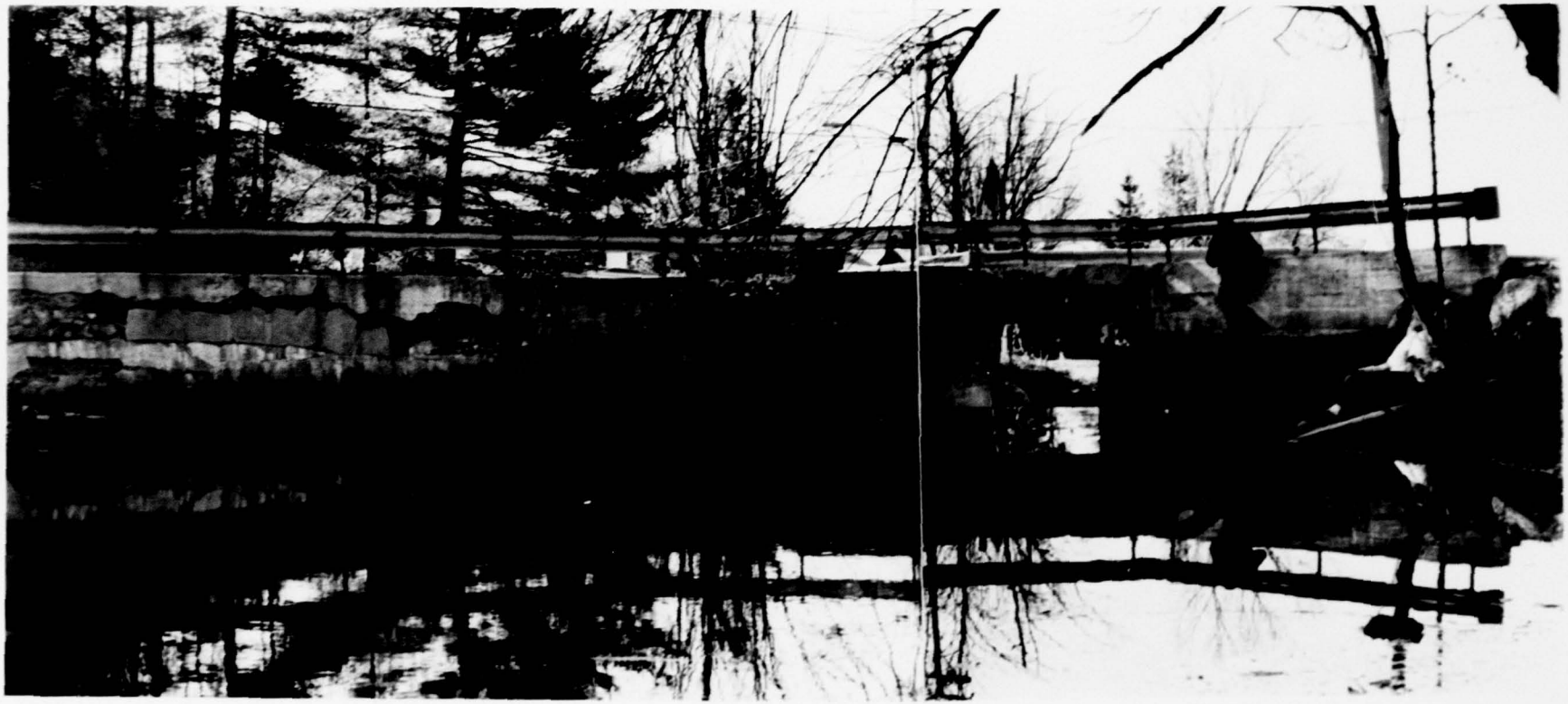
Approved By:

Clark H. Benn

Col. Clark H. Benn
New York District Engineer

Date:

17 April 79



OVERVIEW - LOOKING DOWNSTREAM

PHASE 1 INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
BRANT LAKE UPPER DAM I.D. No. NY-158
(#652)
UPPER HUDSON RIVER BASIN
WARREN COUNTY, NEW YORK

SECTION 1: PROJECT INFORMATION

1.1 GENERAL

a. Authority

The Phase I inspection reported herein was authorized by the Department of the Army, New York District, Corps of Engineers, to fulfill the requirements of the National Dam Inspection Act, Public Law 92-367.

b. Purpose of Inspection

To evaluate the existing conditions of the dam, to identify deficiencies and hazardous conditions, determine if they constitute hazards to life and property, and recommend remedial measures where necessary.

1.2 DESCRIPTION OF PROJECT

a. Description of the Dam and Appurtenant Structures

The Brant Lake Upper Dam consists of a spillway section in the center and wingwalls retaining fill and natural ground on either side. A town highway crosses the top of the dam on a bridge spaning the spillway. Based on available information, the dam is approximately 35 feet long.

The spillway section is about 15 feet long and is composed of a block of concrete 3.5 feet wide and 9 feet high. The vertical drop from the spillway crest to its base at the downstream channel is 7 feet.

Masonry wingwalls extend out from either end of the spillway. These masonry walls appear to have been a portion of the original dam. Only one of these walls is still exposed, the other having been covered by the east abutment of the bridge. The top of this exposed wall is about 2 feet above the spillway crest. This level was apparently the original top of the dam. Fill material placed as part of the dam ties into the natural ground surface at a point near the end of these walls.

The existing highway bridge was constructed on top of the dam. The bridge abutments rest on the ends of the spillway. Concrete wingwalls were built on each end of both abutments to permit raising the grade of the highway. This increased the effective height of the dam to 5.5 feet above the spillway crest.

b. Location

Brant Lake Upper Dam is located at the southern end of Brant Lake in the Town of Horicon. The lake outlets into a small pond formed by the Brant Lake Lower Dam. This in turn empties into a tributary of the Schroon River.

c. Size Classification

This dam is 11.5 feet high and the reservoir has a storage capacity of 37,075 acre feet. Therefore, the dam is in the "intermediate" size category as defined by the Recommended Guidelines for Safety Inspection of Dams.

d. Hazard Classification

The dam is classified as "high" hazard due to the presence of 10 to 15 houses, several stores, the town hall and a fire station downstream of the dam.

e. Ownership

The dam is owned by the Town of Horicon.

f. Purpose of Dam

The dam is now used exclusively to maintain the water level of Brant Lake. The lake is used primarily for recreational purposes.

g. Design and Construction History

Based on the records available, the dam was constructed in 1908. No construction plans were available for the structure so it was not possible to determine the exact date of construction or the name of the designer.

h. Normal Operation Procedures

Water flows over an ungated spillway.

1.3 PERTINENT DATA

a. Drainage Area (acres)	26100
b. Discharge at Dam (cfs)	
Total at Maximum High Water (Top of Bridge/Roadway)	940
Spillway @ Top of Dam	436
c. Elevation	
Top of Bridge/Roadway	804.5±
Top of Dam	803.5
Spillway Crest	799
Lake Surface Elevation (1966 USGS 7.5' quad)	799
d. Reservoir (acres)	
Top of Bridge/Roadway	1761 (est.)
Surface Area at Top of Dam	1711 (est.)
Surface Area at Crest of Spillway	1490
e. Storage Capacity (acre-feet)	
Top of Bridge/Roadway	38815
Top of Dam	37075
Spillway Crest	29875
f. Dam	
Earth dam with a concrete drop spillway in the center	
Dam length (ft)	34(+)
Vertical Downstream Face on Concrete Section	
Earth portions of dam retained by wingwalls	
Crest Elevation	803.5
Crest Width (ft)	30 (+)

g. Spillway

Type:	Uncontrolled rectangular concrete drop structure having a 3.5 foot wide broad crested weir.	
Length (ft)	Weir	14.8

SECTION 2: ENGINEERING DATA

2.1 DESIGN

a. Geology

The Brant Lake Upper Dam is located in the "Adirondack Highlands" physiographic province of New York State. Bedrock in this area consists of medasedimentary gneisses, marbles and quartzites. The surficial soils are the result of glaciations during the Cenozoic Era.

b. Subsurface Investigations

We were unable to locate any record of subsurface investigations taken for this structure. The only information available is from inspection reports dated August 13, 1913 and July 16, 1920, both of which suggest that the foundation soil is predominantly gravel.

2.2 CONSTRUCTION RECORDS

No construction records were available for this structure.

2.3 OPERATION RECORDS

There were no operating or water level records available for this structure.

2.4 EVALUATION OF DATA

The only data available for this report was from the Department of Environmental Conservation files. New York State Conservation Commission inspection reports from 1913 and 1920 were the sole source of subsurface and structural information on this structure. While the information available concerning this dam was quite limited, it appears to be adequate and reliable for the purpose of the Phase I Inspection.

SECTION 3: VISUAL INSPECTION

3.1 FINDINGS

a. General

Visual inspection of Brant Lake Upper Dam was conducted on October 24, 1978. The weather was clear and the temperature was in the forties. Water was flowing approximately 1 inch deep over the spillway at the time of the inspection.

b. Dam

This dam is a small structure with a highway running across the top. The spillway is in the center of the structure. A highway bridge spans this spillway. The bridge abutments rest on either end of the spillway. Beyond the ends of the spillway the soil serves both as dam embankment and roadway subgrade and is retained by the abutments and wingwalls. The wingwalls extend up to about 5.5 feet above the spillway crest, to the level of the roadway surface. The dam embankemnt ties into the natural soil at some point near the end of the wingwalls. The section of natural soil becomes very wide beyond the end of the walls and so will not be considered as part of the dam.

c. Spillway

The spillway itself consists primarily of a mass of concrete between the abutments. The entire block forms a broad crested wier 14.8 feet long by 3.5 feet wide. The concrete which was visible on the spillway block itself, appeared to be in satisfactory condition.

d. Highway Bridge

The highway bridge which carries a town road over the dam (New York State Bridge No. 3305250) is in poor condition. Concrete on the bridge is seriously deteriorated, especially on the upstream fascia where the coarse aggregate is exposed over almost half of the fascia. In addition to this deterioration, there is a small area under the east abutment which has been scoured due to flow over the spillway. The area is several feet long but only a couple of inches deep. It is near the point where the east wingwall on the upstream face ties into the abutment.

The Town of Horicon is now investigating the possibility of reconstructing this bridge. If they are able to secure funding,they plan to rebuild the bridge within a year. Should this bridge collapse, it might damage the dam or it could block the spillway.

e. Wingwalls

There are concrete wingwalls on either side of both abutments. The wall on the east side of the upstream face (northeastern wall) is in poor condition. The flow of water has cut into the face of the wall and has undermined the toe slightly. This wall retains an area where the soil section is widest and so it is unlikely that failure of the wall would endanger the dam or allow the water to flow around the end of the structure.

The wall on the west side of the upstream face is in satisfactory condition. This wall is composed of a concrete section about 4 feet high founded on a masonry block base which is also about 4 feet.

Surface runoff from the road and possibly scour which occured at times of high water had eroded some of the soil beyond the end of the wall. In an apparent attempt to stop this erosion, sand bags had been placed at the end of the wall beginning at the toe and continuing about half the way up the slope. This erosion problem does not appear to be serious.

Both retaining walls on the downstream side appear to be in satisfactory condition.

f. Downstream Channel

Flow over the spillway falls into a boulder filled stream bed. This channel is only about 25 feet long. It then empties into the backwater pond formed by the lower dam. This Lower Dam is about one half mile downstream of the Upper Dam.

There is one area near the Lower Dam which appears to be at a lower elevation than the dam crest. In the event of a failure of the Upper Dam, the floodwaters would probably flow through this area affecting the post office and several houses.

3.2 EVALUATION OF OBSERVATIONS

Visual observations did not reveal any serious problems which would affect the immediate safety of the dam. However, the following deficiencies were noted:

1. Deterioration of concrete on the northeast wingwall.
2. Void under the concrete at the junction of the northeast wingwall and the east abutment.
3. Minor concrete spalling in the zone of aeration of the flowing water on several of the remaining concrete faces.
4. Deterioration of the concrete and generally poor condition of the highway bridge on top of the dam.

SECTION 4: OPERATION AND MAINTENANCE PROCEDURES

4.1 PROCEDURE

Normal water surface elevation is at the crest of the spillway. Downstream flows are uncontrolled over this spillway. The reservoir provides 7,200 acre-feet of storage between the crest of the spillway and the top of the dam.

4.2 MAINTENANCE OF DAM

From the information available to us, we would assume that no maintenance has been done on the dam for a number of years.

4.3 WARNING SYSTEM IN EFFECT

No apparent warning system is present.

4.4 EVALUATION

Some maintenance is required on the dam, mainly to repair the deteriorated concrete surfaces.

SECTION 5: HYDROLOGIC/HYDRAULIC

5.1 DRAINAGE AREA CHARACTERISTICS

Delineation of the contributing watershed to Brant Lake was made using both USGS 7.5 and 15 minute quadrangle sheets. The 40.78 sq. mi. rectangular-shaped watershed consists of forested and wooded lands throughout. Relief is relatively steep; the areas South and East of Brant Lake have slopes in the range of 10 to 35% and the areas Northeast to West of the Lake have slopes in the range of 45 to 70%. Mountain peaks occur at elevations 600 to 1300 feet above normal lake level.

5.2 ANALYSIS CRITERIA

No hydrologic/hydraulic information was available regarding the original design for this dam. Therefore, the analysis of the spillway capacity of the dam was performed using the Corps of Engineers HEC-1 computer program, incorporating the "Snyder Synthetic Unit Hydrograph" method and the "Modified Puls" flood routing procedure. The spillway design flood selected for analysis was the PMF in accordance with recommended guidelines of the U.S. Army Corps of Engineers.

5.3 SPILLWAY CAPACITY

The single, concrete drop spillway located in the center of the dam is uncontrolled, with a sloping crest 3.5 feet wide and 14.8 feet long.

Hydraulically, the spillway was analyzed operating under weir flow and orifice flow conditions. Weir flow was evaluated from the spillway crest upward to the bottom-side of the bridge beams spanning the spillway. Acting as a broad-crested weir, a discharge coefficient varying with head was used in the analysis. Orifice flow under low head conditions was evaluated for water surface elevations above the bottom side of bridge beams elevation. If the water surface overtops the bridge and roadway, a combination of orifice flow through the drop spillway and weir flow over the bridge and roadway was analyzed.

The spillway capacity of 940 cfs is not sufficient for discharging the peak outflow from the PMF. However, the spillway does have sufficient capacity for discharging the peak outflow from 1/2 the PMF. For this storm, the peak inflow is 12,400 cfs and the peak outflow is 390 cfs. For the PMF, the peak inflow is 24,800 cfs and the peak outflow is 5,200 cfs.

5.4 RESERVOIR CAPACITY

Normal reservoir capacity when the water surface is at the spillway crest elevation is 29,875 acre-feet including approximately 20,100 acre-feet of dead storage. Surcharge storage capacity to the top-of-dam elevation is an additional 7,200 acre-feet, which is equivalent to a runoff depth of 3.3 inches over the drainage area. Additonal storage capacity to the top-of-bridge/roadway elevation is an additional 1,740 acre-feet or 0.8 inches of runoff depth.

5.5 FLOODS OF RECORD

No information was available regarding the occurrence of the maximum known flood.

5.6 OVERTOPPING POTENTIAL

Analysis using the PMF indicates the spillway does not have sufficient discharge capacity. For the peak outflow of 5,200 cfs, the discharge capacity is 940 cfs. Hence, overtopping of the dam and also the bridge/roadway to computed depths of 4.5 feet and 3.5 feet respectively would occur for this outflow.

5.7 EVALUATION

This dam does have sufficient capacity to satisfactorily discharge the peak outflow from 1/2 the PMF without overtopping. It does not have sufficient capacity to satisfactorily discharge the PMF peak outflow. Therefore, the dam is regarded as having inadequate spillway capacity.

SECTION 6: STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations

Visual observation of the dam did not reveal any signs of major distress. The spillway section, the abutments, and the wingwalls all appeared to be relatively stable. The only problem noted was the undermining near the point where the east abutment joins the northeast wingwall. Further undermining in this area could result in a stability problem.

b. Design and Construction Data

No design computations or other data were available on the structural stability of the structure. We were not able to locate any construction records.

c. Data Review and Stability Evaluation

The only data available concerning this structure was from the Department of Environmental Conservation files. The 1913 and 1920 N.Y. State Conservation Commission inspection reports were the sole source of structural and subsurface information. Due to the limited data, certain assumptions concerning the dam and its foundation conditions had to be made.

The structural analysis was based on a cross section of the spillway section shown on the 1920 inspection report. While substantial modifications have been made on top of the dam (placing additional fill and constructing the highway bridge), we believe that the concrete spillway section has remained essentially unchanged. It is also our belief that the concrete section extends beyond the ends of the spillway into the highway embankment. However, since we were unable to document this opinion, the spillway section was analyzed as acting independent of the abutments.

Stability analyses were performed for the following three conditons:

a. normal conditions with reservoir at the spillway crest
b. 1/2 PMF, water flowing over the spillway 4.3 feet deep.
c. reservoir at spillway crest with ice load of 5000 lb/ft.

The analyses performed (see Appendix E) indicate unsatisfactory stability against overturning and sliding for the forces assumed.

CASE	FACTORS OF SAFETY	
	OVERTURNING	SLIDING
I. Reservoir Level at Spillway Crest; No ice	1.41	1.06
II. 1/2 PMF; Water flowing over Spillway to Depth of 4.3 Ft.; No ice	.78	.53
III. Reservoir at Spillway Crest; Ice Load of 5,000 lb/ft.	.40	.42

These factors of safety indicate a critical deficiency in the stability of this structure. However, the dam has withstood the test of time (having been in existence since about 1908). As stated above, there were no signs of major distress observed during the visual inspection. Therefore, it appears that the concrete section is deriving some support from the area beyond the ends of the spillway. Further investigation will be required to confirm this opinion.

d. Seismic Stabiltiy

The dam is located in Seismic Zone No. 2. Since the seismic coefficient is relatively small, a seismic stability analysis is not warranted.

SECTION 7: ASSESSMENT/RECOMMENDATIONS

7.1 ASSESSMENT

a. Safety

The Phase I inspection of Brant Lake Upper Dam did not reveal any conditions which constitute a hazard to human life or property. The dam and earth embankments appear to be stable. Concrete on the bridge which crosses the dam and the northeast wingwall are deteriorated but failure of either of these would probably not affect the integrity of the structure.

b. Adequacy of Information

The information available was extremely limited. No construction plans, subsurface information, or hydrologic data were available. Therefore, the observations made during the visual inspection of the structure were the primary source of information on this structure.

c. Urgency

The condition of the dam and dike is considered to be a non-emergency situation not requiring immediate action to protect the downstream development.

The stability analyses indicate that the safety factors for all conditions analyzed are unsatisfactory. Further investigation of the structural stability is needed. This study should be commenced within six months of the date of final approval of this report.

7.2 RECOMMENDED MEASURES

a. Investigate the concrete spillway section to determine the exact limits and dimensions of the concrete, and using this information reassess the stability of the dam.

b. Fill the void which exists at the eastern end of the spillway under the bridge abutment.

c. Repair the deteriorated concrete on the northeastern wingwall.

d. Repair or replace the highway bridge crossing the dam.

e. Establish a program of periodic inspections of the dam.

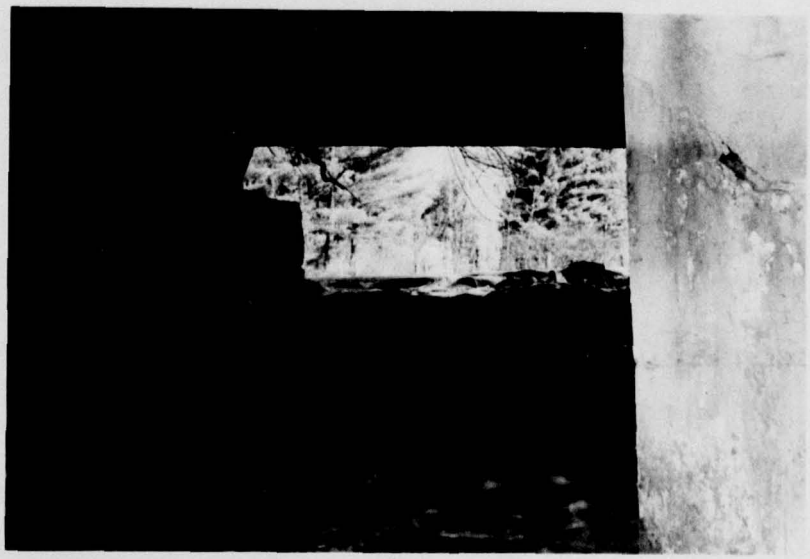
f. Maintain a record of maintenance of the dam.

g. Develop and place in readiness a warning system for possible future use during periods of unusually heavy precipitation.

APPENDIX A

PHOTOGRAPHS

Dam (Circa. 1920)



Spillway Looking Upstream

Scour Hole At East Abutment

Concrete Deterioration in Zone of Aeration

Top of Dam at West Abutment

Concrete Deterioration on Bridge Fascia

APPENDIX B

ENGINEERING DATA CHECKLIST

Check List
Engineering Data
Design Construction Operation

Name of Dam ~~TABAN FALLS~~ UPPER DAM
I.D. # NY-158
#655 - UPPER HUDSON

Item	Remarks		
	Plans	Details	Typical Sections
Dam	NONE		
Spillway(s)	NONE		
Outlet(s)	NONE		
Design Reports	NONE		
Design Computations			
Discharge Rating Curves			
Dam Stability			
Seepage Studies			
Subsurface and Materials Investigations			

BRANT LAKE
UPPER DAM NY-152

Item		Remarks
Construction History	DAM REPORT - APPLICATIONS DATED: AUG - 1913 JULY - 1920	N/A
Surveys, Modifications, Post-Construction Engineering Studies and Reports		N/A
Accidents or Failure of Dam Description, Reports		N/A
Operation and Maintenance Records Operation Manual		NONE

APPENDIX C

VISUAL INSPECTION CHECKLIST

VISUAL INSPECTION CHECKLIST

1) Basic Data

a. General

Name of Dam BRANT LAKE UPPER DAM

I.D. # NY-158 (#1052 - UPPER HUDSON)

Location: Town HORICON County WARREN

Stream Name UNNAMED

Tributary of SCHROON RIVER

Longitude (W), Latitude (N) W 73°-44'-57" / N 43°-40'-39"

Hazard Category C

Date(s) of Inspection 10/24/78

Weather Conditions CLEAR SUNNY 40°F

b. Inspection Personnel R. WARRENDER W LYNICK

c. Persons Contacted E. BUMP (TOWN SUPERVISOR) 518-494-3647 - TOWN HALL

d. History:

Date Constructed 1908

Owner TOWN OF HORICON

Designer UNKNOWN

Constructed by UNKNOWN

2) Technical Data

Type of Dam STONE-BLOCK MASONRY AND CONCRETE

Drainage Area 26100 ACRES

Height 11.5' Length 34' (+)

Upstream Slope N/A Downstream Slope N/A

CONCRETE DROP STRUCTURE

2) Technical Data (Cont'd.)

External Drains: on Downstream Face N/A @ Downstream Toe N/A

Internal Components:

Impervious Core NONE

Drains NONE

Cutoff Type NONE

Grout Curtain NONE

3) **Embankment**

EARTH BACKFILL CONTAINED BY BRIDGE ABUTMENTS AND WINGWALLS; PAVED ROAD FORMS THE TOP OF THE BACKFILL

a. **Crest**

(1) **Vertical Alignment** SATISFACTORY

(2) **Horizontal Alignment** SATISFACTORY

(3) **Surface Cracks** N/A

(4) **Miscellaneous**

b. **Slopes**

(1) **Undesirable Growth or Debris, Animal Burrows** N/A

(2) **Sloughing, Subsidence or Depressions** N/A

(3) **Slope Protection** N/A

(4) **Surface Cracks or Movement at Toe** N/A

(5) **Seepage** N/A

(6) **Condition Around Outlet Structure** N/A

4) Instrumentation

(1) Monumentation/Surveys NONE

(2) Observation Wells N/A

(3) Weirs N/A

(4) Piezometers N/A

(5) Other

5) Reservoir

a. Slopes SATISFACTORY

b. Sedimentation NOT EVIDENT

6) **Spillway(s) (including tail race channel)**

2 BENT PIPES (12" ± LENGTH) - POSSIBLY THE REMAINS OF FORMER FLASHBOARD SUPPORTS

a. **General** FOUNDATION - NATURAL CHANNEL, BOULDERS & ROCK IN TAILWATER AREA

b. **Principle Spillway** CONCRETE DROP STRUCTURE

WEST ABUTMENT:
STONE BLOCKS - SATISFACTORY SOME CONCRETE FASCIA CRACKS
SOME CONCRETE SPALLING (± 2½" DEEP) NEAR DROP

EAST ABUTMENT:
NORTHEAST WINGWALL @ ABUTMENT - HOLE & UNDERMINED @ WATER SURFACE
FASCIA CONCRETE - SPALLED (± 40% - 50%)
DOWNSTREAM OF DROP - CONCRETE HAS SOME SURFACE SPALLING

CONCRETE SPALLING - OCCURS IN OR NEAR ZONE OF AERATION OF FLOWING WATER - ON ALL SURFACES

c. **Emergency or Auxiliary Spillway** N/A

d. **Condition of** DOWNSTREAM **channel** @ SPILLWAY:

SATISFACTORY; BOULDERS IN STREAMBED

LOWER DAM RESERVOIR - BACKWATER DEPTH ≈ 1.5'

e. **Stability of Channel side/slopes** N/A

7) Downstream Channel

RESERVOIR - BRANT LAKE LOWER DAM

a. Condition (debris, etc.) NONE

b. Slopes SATISFACTORY

c. Approximate number of homes 6 RESIDENCES ; ELEMENTARY SCHOOL ; TOWN HALL ; FIRE STATION ; 2 GASOLINE STATIONS ; TOWN LIBRARY ; 6 RESIDENCES DOWNSTREAM OF BRANT LAKE LOWER DAM

8) Miscellaneous

9) Structural

a. Concrete Surfaces SEE 6b - PRINCIPAL SPILLWAY

b. Structural Cracking NONE APPARENT

c. Movement - Horizontal & Vertical Alignment (Settlement) NONE APPARENT

d. Junctions with Abutments BRIDGE [redacted] SATISFACTORY

e. Drains - Foundation, Joint, Face N/A

f. Water passages, conduits, sluices N/A

g. Seepage or Leakage NONE

h. Joints - Construction, etc. _____

i. Foundation BOULDERS & ROCK IN STREAMBED BELOW DROP

j. Abutments EAST BRIDGE ABUTMENT - HOLE & UNDERMINED @ WATER SURFACE
CONCRETE CRACKED ; REPAIRS DUE IN 1979

k. Control Gates NONE

l. Approach & Outlet Channels N/A

m. Energy Dissipators (plunge pool, etc.) NONE

n. Intake Structures N/A

o. Stability _____

p. Miscellaneous _____

APPENDIX D

HYDROLOGIC/HYDRAULIC

ENGINEERING DATA AND COMPUTATIONS

CHECK LIST FOR DAMS
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

BRANT LAKE
UPPER DAM NY-158

AREA-CAPACITY DATA:

	Elevation (ft.)	Surface Area (acres)	Storage Capacity (acre-ft.)
1) Top of Dam (BOTTOM OF BRIDGE STRINGER)	803.5	1711 (EST.)	37075 (EST.)
2) Design High Water (Max. Design Pool)	NA		
3) Auxiliary Spillway Crest	NA		
4) Pool Level with Flashboards	NA		
5) Service Spillway Crest	799 (1966 USGS 7.5' QUAD)	1490	29875 (EST.)

DISCHARGES

	Volume (cfs)
1) Average Daily	NA
2) Spillway @ Maximum High Water (TOP OF BRIDGE ELEV. 804.5)	940
3) Spillway @ [redacted] TOP OF DAM ELEV.	436
4) Spillway @ Auxiliary Spillway Crest Elevation	NA
5) Low Level Outlet	NA
6) Total (of all facilities) @ Maximum High Water	940
7) Maximum Known Flood	UNKNOWN

CREST: **ELEVATION:** 803.5

Type: STONE-BLOCK MASONRY AND CONCRETE; EARTH BACKFILL BEHIND BRIDGE ABUTMENTS

Width: 30' INCL. BRIDGE ABUTMENT WINGWALLS Length: 34' + EAST ABUTMENT WALL THICKNESS

Spillover PRINCIPAL SPILLWAY

Location CENTER OF DAM; BETWEEN THE BRIDGE ABUTMENTS

SPILLWAY:

PRINCIPAL		EMERGENCY
799 [1966 USGS 7.5' QUAD]	Elevation	
CONCRETE VERTICAL DROP STRUCTURE	Type	NONE
3.5'	Width	
	Type of Control	
✓	Uncontrolled	
	Controlled:	
POSSIBLY USED AT ONE TIME 2 BENT STEEL RODS IN CREST	Type (Flashboards; [redacted])	
	Number	
14.8'	[redacted]/Length	
	Invert Material	
	Anticipated Length of operating service	
N/A	Chute Length	
0'	Height Between Spillway Crest & Approach Channel Invert (Weir Flow)	

(PRINCIPAL SPILLWAY)/ (NONE)
OUTLET STRUCTURES/EMERGENCY DRAWDOWN FACILITIES:

Type: Gate _____ Sluice _____ Conduit _____ Penstock _____

Shape : _____

Size: _____

Elevations: Entrance Invert _____

Exit Invert _____

Tailrace Channel: Elevation _____

HYDROMETEROLOGICAL GAGES:

Type : N/A

Location: _____

Records:

Date - _____

Max. Reading - _____

FLOOD WATER CONTROL SYSTEM:

Warning System: NONE

_____

Method of Controlled Releases (mechanisms):

NONE

_____

OTHER: 1) BRANT LAKE (AS A WATER RESOURCE) IS CLASSIFIED "AA - SPECIAL"

DRAINAGE AREA: 26100 ACRES 40.78 SQ MILES

DRAINAGE BASIN RUNOFF CHARACTERISTICS:

Land Use - Type: HEAVILY WOODED & FORESTED

Terrain - Relief: RELATIVELY STEEP SLOPES; MOUNTAIN PEAKS @ ELEV. 1400 - 3100

Surface - Soil: ROCK; GRAVEL

Runoff Potential (existing or planned extensive alterations to existing (surface or subsurface conditions)

N/A

Potential Sedimentation problem areas (natural or man-made; present or future)

N/A

Potential Backwater problem areas for levels at maximum storage capacity including surcharge storage:

NONE

Dikes - Floodwalls (overflow & non-overflow) - Low reaches along the Reservoir perimeter:

Location: NONE

Elevation:

Reservoir:

Length @ Maximum Pool APPROXIMATELY 5 (Miles)

Length of Shoreline (@ Spillway Crest) APPROXIMATELY 12 (Miles)

GA-17 (4/70) NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
BRANT LAKE H&H - PHASE I RPT.	1/3		
SUBJECT		**COMPUTED BY**	**DATE**
DRAINAGE AREAS - SUMMARY		WCL	12/8/78

	UPPER DAM	LOWER DAM
DRAINAGE AREA:	26100 ACRES	26240 ACRES
	40.78 SQ MI.	41.0 SQ MI.
USGS QUAD:		
SURFACE AREA:	1490 ACRES	5 ACRES

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PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
BRANT LAKE H & H - PHASE I RPT.	2/3		
SUBJECT		**COMPUTED BY**	**DATE**
DRAINAGE AREAS - PLANIMETERED		WCL	12/8/78

CALIBRATION 2" SQ = 3.99"²

USGS QUAD: ENTIRE AREA
SCALE: 1:62500

UPPER DAM DR. AREA -	41.91 IN²	26099 ACRES (26100)	40.78 SQ MI.
SURFACE - LAKE +	2.38 IN²	1482 ACRES	
	41.91	(200) 199 ACRES	
LOWER DAM DR. AREA - +	0.32 IN²	(26300)	
	42.23 IN²	26298 ACRES	41.09 SQ MI.
SURFACE - POND +	0.02 IN²	12.45 ACRES	
AREA: N OF 43° 45' AND E OF 73° 37' 30" +	4.59 IN²	2858 ACRES (2860)	4.47 SQ MI.

SCALE: 1:62500

1" = 5208.33'

1 SQ IN = 27,126,735 FT²

= 622.74 ACRES

= 0.973 SQ MILES

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PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
BRANT LAKE H & H - PHASE I RPT.	3/3		
SUBJECT		**COMPUTED BY**	**DATE**
DRAINAGE AREAS - PLANIMETERED		WCL	12/8/78

CALIBRATION 1" SQ = 4.00"

USGS QUAD: AREA S OF 44° 00' AND W OF 73° 35'

SCALE: 1: 24000

UPPER DAM SURFACE AREA - LAKE

11.15 IN²
+ 5.05
16.20 IN²

(1490)
1488 ACRES

LOWER DAM SURFACE - POND

0.05 IN²

(5)
4.6 ACRES

LOWER DAM PARTIAL DRAINAGE AREA

1.50 IN²

138 ACRES
(140)

SCALE: 1: 24000

1" = 2000'

1 SQ IN = 4,000,000 SQ FT

= 91.83 ACRES

= 0.143 SQ MILES

GA-17 (4/70) NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
BRANT LAKE H&H - PHASE I RPT.	4/		
SUBJECT		**COMPUTED BY**	**DATE**
STAGE - STORAGE DATA		WCL	12/8/78

REF: NYS-DEC INFORMATION LEAFLET # AS-56
BRANT LAKE DEPTH CONTOURS

GIVEN:
AREA: 1357 ACRES
ELEV: 801
LENGTH: 5 MILES ±

SCALE: 1" = APPROX. 0.5 MILE (+)

USE 1" = 2650'

PLANIMETERED AREAS:

ELEVATION	AREA	%
0	10.27 IN^2	100
-10	6.93 IN^2	67
-20	4.96 IN^2	48
-30	2.27 IN^2	22
-40	0.93 IN^2	9
-50	0.45 IN^2	4
-60	0.10 IN^2	1

GIVEN SCALE AND PLANIMETERED AREAS DO NOT AGREE WITH THE GIVEN AREA OF THE LAKE (1656 ACRES VS. 1357 ACRES)

THEREFORE; APPLY THE ABOVE PERCENTAGES TO THE USGS QUAD SURFACE AREA OF 1490 ACRES (SHT 1/3)

LAKE - SURFACE AREAS:

ELEV.	AREA (ACRES)	ELEV.	AREA (ACRES)
0	1490		
-10	998	-40	134
-20	715	-50	60
-30	328	-60	15

INFORMATION LEAFLET

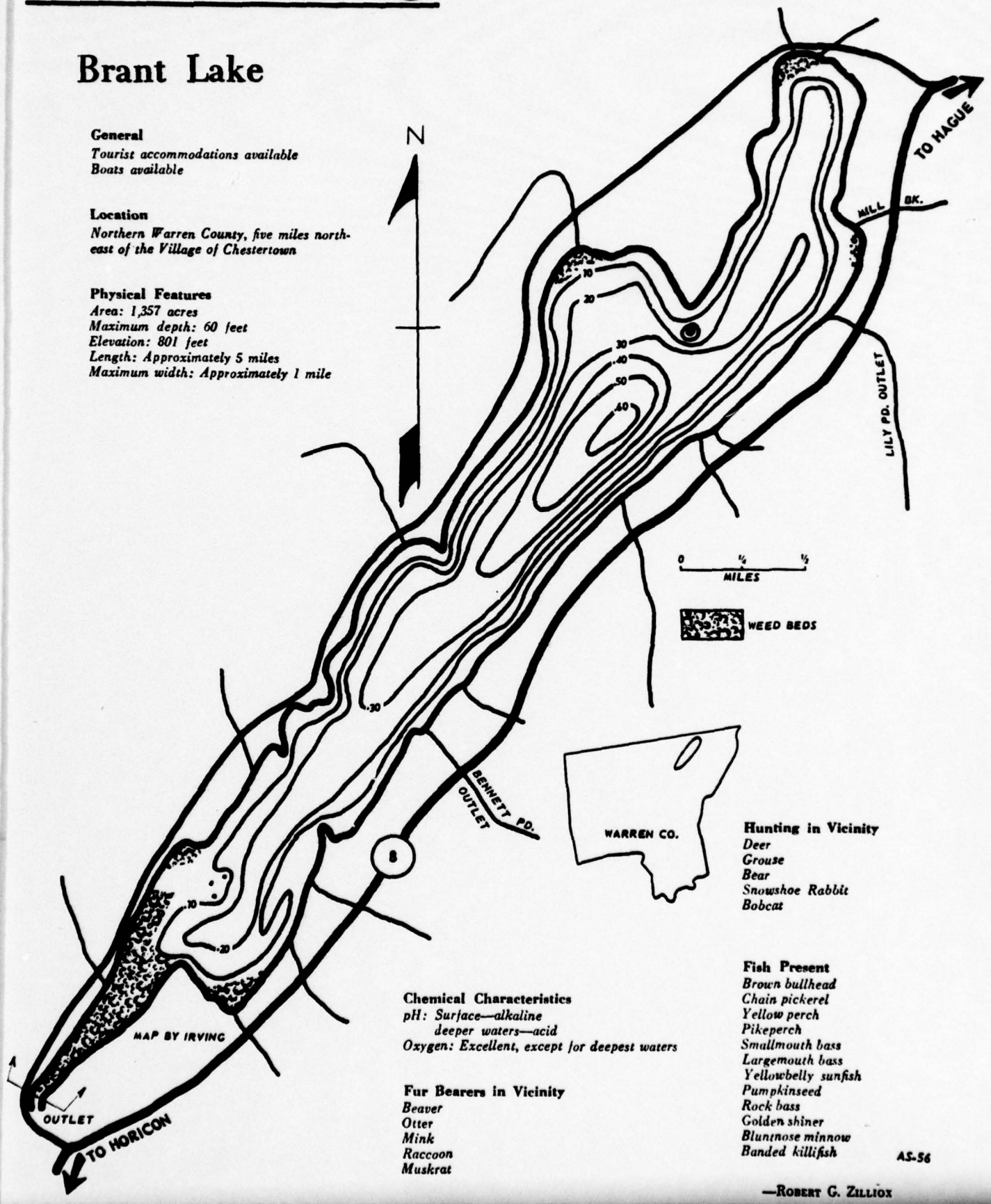
NEW YORK STATE
DEPT. OF ENVIRONMENTAL CONSERVATION
CONSERVATION EDUCATION

Brant Lake

General
Tourist accommodations available
Boats available

Location
Northern Warren County, five miles northeast of the Village of Chestertown

Physical Features
Area: 1,357 acres
Maximum depth: 60 feet
Elevation: 801 feet
Length: Approximately 5 miles
Maximum width: Approximately 1 mile



Hunting in Vicinity
Deer
Grouse
Bear
Snowshoe Rabbit
Bobcat

Chemical Characteristics
pH: Surface—alkaline
deeper waters—acid
Oxygen: Excellent, except for deepest waters

Fur Bearers in Vicinity
Beaver
Otter
Mink
Raccoon
Muskrat

Fish Present
Brown bullhead
Chain pickerel
Yellow perch
Pikeperch
Smallmouth bass
Largemouth bass
Yellowbelly sunfish
Pumpkinseed
Rock bass
Golden shiner
Bluntnose minnow
Banded killifish

AS-56

—Robert G. Zilliox

GA-17 (4/70) NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
BRANT LAKE H & H - PHASE I RPT	5/		
SUBJECT STORAGE CAPACITY	SEE SHT 14/	COMPUTED BY WCL	DATE 12/11/78

ELEV.	SURFACE AREA (ACRES)	Δ STORAGE (AC-FT)	Σ STORAGE (AC-FT)
[1966 USGS QUAD]			
799 0	1490		
		12440	29875
789 -10	998		
		8565	17435
779 -20	715		
		5215	8870
769 -30	328		
		2310	3655
759 -40	134		
		970	1345
749 -50	60		
		375	375
739 -60	15		

GA-17 (4/70) NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
BRANT LAKE H & H - PHASE I RPT	6/		
SUBJECT		**COMPUTED BY**	**DATE**
H & H ANALYSIS USING HEC-1		WCL	12/11/78

DAM HT: 7' (CREST TO BASE) } INTERMEDIATE SIZE

STORAGE: < 50 000 AC-FT }

[11.5' TO BOTTOM OF BRIDGE STRINGER

[12.5'± TO TOP PAVEMENT ON BRIDGE ROADWAY ACTING AS WEIR

HAZARD POTENTIAL : HIGH

∴ H & H EVALUATION — PMF STORM
ALSO ½ PMF

GA-17 (4/70) NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
BRANT LAKE H & H - PHASE I RPT	7/		
SUBJECT		**COMPUTED BY**	**DATE**
PMP RAINFALL - NWS HR # 33		WCL	12/11/78

LAT: N 43° 45' LONG: W 73° 40'

ZONE 1: (ALL-SEASON)

PMP = 17.5" (24 HR - 200 SQ MILE)

FOR DRAINAGE AREA = 40.78 SQ MI.

	%	PMP
6 HR	94	16.45"
12 HR	108	18.9"
24 HR	118	20.65"
48 HR	126	22.05"

TRANSPOSITION FACTOR:

$$T.F. = 1 - \frac{0.3008}{(DR.A.)^{0.11118}}$$

$$= 1 - \frac{0.3008}{(40.78)^{0.11118}}$$

$$= 1 - 0.156$$

$$T.F. = 0.844$$

GA-17 (4/70) NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
BRANT LAKE H & H - PHASE I RPT	8/		
SUBJECT		**COMPUTED BY**	**DATE**
SNYDER UH COMPUTATIONS - INPUT FOR HEC-1		WCL	12/11/78

L:

DAM - 0

END LAKE - 14.3"

(320+) POND OUTLET - 18.1"

BRANCH - 19.5"

43° 45' - 22.4" 1" = 2000' 44800' 8.48 MILES

43° 45' - 0

POND OUTLET - 3.1"

EDGE BASIN - 4.45" 1" = 5200" 23175' 4.39 MILES

L = 12.87 MILES

L_{CA}:

5.6" @ 1" = 5208' = 29165'

L_{CA} = 5.52 MILES

LAG TIME:

$t_p = C_t (L \cdot L_{CA})^{0.3}$ AVE C_t = 2.0 USE C_t = 2.5

$= (2.5)(12.87 \cdot 5.52)^{0.3}$

1) LONG DRAINAGE AREA
2) HEADWATER PONDING EFFECT ON MOST TRIBUTARIES

(t_p = 9 HRS) t_p = 8.98

UNIT RAINFALL DURATION:

$t_r = \frac{t_p}{5.5}$

$= \frac{8.98}{5.5} = 1.63$ HRS (USE t_R 2-HR HYDROGRAPH)

ADJUSTED LAG TIME:

$t_{pR} = t_p + 0.25(t_R - t_r)$

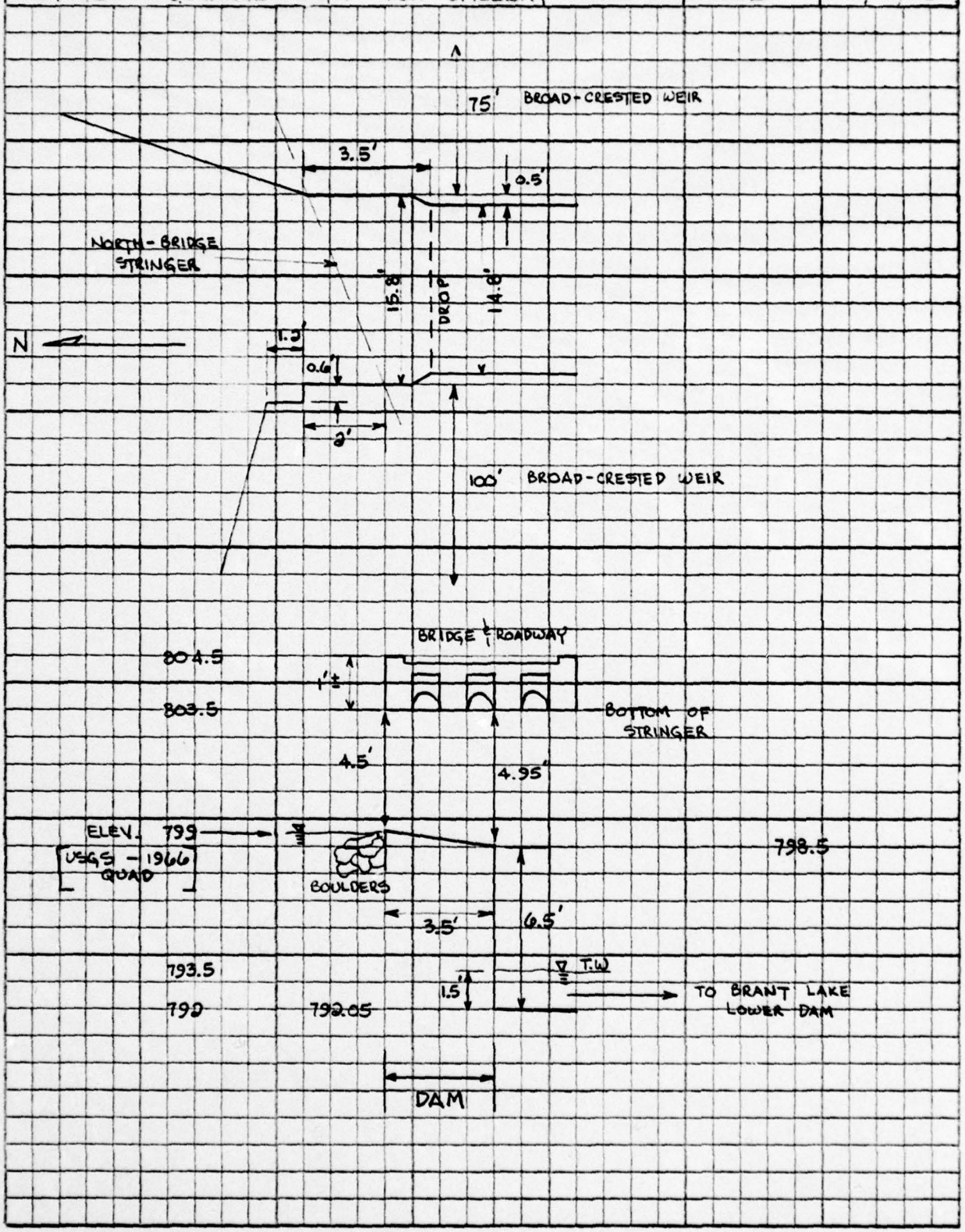
$= 8.98 + 0.25(2 - 1.63)$

t_{pR} = 9.07 HRS (USE C_p = 0.625)

GA-17 (4/70) NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
BRANT LAKE H&H - PHASE I RPT	9/		
SUBJECT		**COMPUTED BY**	**DATE**
STAGE - DISCHARGE DATA FOR SPILLWAY		WCL	12/12/75



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PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
BRANT LAKE H & H - PHASE I RPT	10/		
SUBJECT		**COMPUTED BY**	**DATE**
STAGE - DISCHARGE DATA FOR SPILLWAY		WCL	12/12/73

REF: KING & BRATTER "HANDBOOK OF HYDRAULICS" 5TH ED.

BROAD-CRESTED WEIR ELEV. 799 — 803.5

$Q = CLH^{3/2}$

$L = 14.8'$

C VARIES WITH H (TABLE 5-3)

(TABLE 5-3)

H	C	$H^{3/2}$	$Q = CLH^{3/2}$
0.5	2.62	.3536	13.7
1.0	2.66	1.0	39.4
1.5	2.66	1.837	72.3
2.0	2.70	2.828	113
2.5	2.77	3.953	162
3.0	2.82	5.196	217
3.5	2.86	6.548	277
4.0	2.93	8.0	347
4.5	3.087	9.546	436
5.0			
5.5			

BOTTOM OF STRINGER

ORIFICE FLOW

ORIFICE & WEIR FLOW

$\Sigma = 25.107$

AVE C = 2.79

GA-17 (4/70) NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

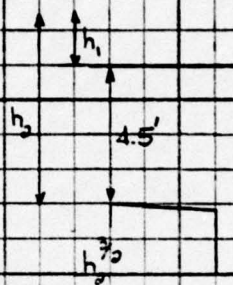
JOB	SHEET NO.	CHECKED BY	DATE
GRANT LAKE H & H - PHASE I RPT	11/		
SUBJECT		**COMPUTED BY**	**DATE**
STAGE - DISCHARGE DATA FOR SPILLWAY		WCL	12/12/73

REF: KING & BRATER "HANDBOOK OF HYDRAULICS" 5TH ED.

ORIFICE FLOW UNDER LOW HEAD ELEV. 303.5 - 304.5

TAILWATER ELEV. @ 793.5

$$Q = \tfrac{2}{3} L \sqrt{2g} \left(h_2^{3/2} - h_1^{3/2} \right)$$



$L = 14.8'$

$g = 32.2$ $\quad \sqrt{2g} = 8.025$

W.S. @ ELEV.	h_1	$h_1^{3/2}$	h_2	$h_2^{3/2}$	Q
304.0	0.5	.3536	5.0	11.18	357
304.5	1.0	1.0	5.5	12.90	942
305.0	1.5	1.837	6.0	14.70	1018
305.5	2.0	2.828	6.5	16.57	1088
306.0	2.5	3.953	7.0	18.52	1153
307.0	3.5	6.548	8.0	22.63	1273
808.0	4.5	9.546	9.0	27.00	1382
809.0	5.5	12.90	10.0	31.62	1482

ORIFICE & WEIR FLOW

CORRESPONDING VALUES FOR HEC 1-DB COMPUTER PROGRAM:

$$\tfrac{2}{3} L \sqrt{2g} \left(h_2^{3/2} - h_1^{3/2} \right) = Q = CA \sqrt{2g} \left(h \right)^{1/2}$$

$\tfrac{2}{3} L = CA = C(L \times 4.5)$ $\qquad L = 14.8'$

$\tfrac{2}{3} = 4.5C$

$0.148 = C$ $\qquad A = 66.6\ ft^2$

GA-17 (4/70) NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
BRANT LAKE H & H – PHASE I RPT	12/		
SUBJECT		**COMPUTED BY**	**DATE**
STAGE – DISCHARGE DATA @ DAM OVER ROADWAY		WCL	12/12/73

REF: KING & BRATER "HANDBOOK OF HYDRAULICS" 5TH ED.

BROAD-CRESTED WEIR ELEV. 804.5 — UPWARD

$Q = CLH^{3/2}$

$C = 3.087$ (MAX.)

$L = 190'$

H	$H^{3/2}$	Q
0.5	.3536	207
1.0	1.0	587
1.5	1.837	1077
2.5	3.953	2319
3.5	6.548	3841
4.5	9.546	5599

GA-17 (4/70) NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
BRANT LAKE H & H - PHASE I RPT	13/		
SUBJECT		**COMPUTED BY**	**DATE**
STAGE - DISCHARGE DATA SUMMARY		WCL	12/13/78

PLOTTED + SHT 13A/

	ELEV.	WEIR	ORIFICE	WEIR	TOTAL (cfs)
	799	0			
	799.5	13.7			
	800	39.4			
	800.5	72.3			
	801	113			
	801.5	162			
	802	217			
	802.5	277			
	803	347	—		
TOP OF DAM	803.5	436 (OR)	756		USE 436
	804	—	857		
TOP OF BRIDGE	804.5	—	942	—	USE 940
	805	—	1018	207	1225
	805.5	—	1088	587	1675
	806	—	1153	1077	2230
	807	—	1273	2319	3592
	808	—	1382	3841	5223
	809	—	1482	5599	7081

13A/

BRANT LAKE UPPER DAM NY-15a
(UPPER HUDSON - 630)

STAGE - DISCHARGE CURVE

DATUM: USGS QUAD SHT
15 MINUTE

ELEVATION

807
806
805
804
803
802
801
800
799

ORIFICE + WEIR FLOW

ORIFICE FLOW

WEIR FLOW

DISCHARGE (CFS)

0 500 1000 1500 2000 2500 3000 3500 4000

GA-17 (4/70) NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
BRANT LAKE H & H - PHASE I RPT	14/		
SUBJECT		**COMPUTED BY**	**DATE**
STAGE - STORAGE DATA		WCL	12/13/78

FROM SHT 5/ :

ELEV.	SURFACE AREA (ACRES)	Δ STORAGE	Σ STORAGE (AC-FT)	
799	1490			
10' 492		12440	29875	
789	998			

Δ AREA/FT ELEV = 49 AC/FT

	ELEV.	AREA		Σ STORAGE	
→	789	998		17435 ←	
			3216		
	792	1146		20650	(BASE OF DAM)
			9226		
→	799	1490		29875 ←	
			7202		
	803.5	1711		37077	(37075)
			1736		
	804.5	1761		38813	
			4556		
	807	1884		43369	

CHANGE NO. 01
****

BRANT LAKE UPPER DAM NY-158 UPPER HUDSON-652
PMF WITH RATIOS--ANALYSIS USING SNYDER METHOD
DATE

JOB SPECIFICATION

NQ	NHR	NMIN	IDAY	IHR	MIN	METRC	IPLT	IPRT	NSTAN
100	2	0	0	0	0	0	0	2	0

JOPER	NWT
5	0

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 2 LRTIO= 1
RTIOS= 0.50 1.00

********** ********** ********** ********** **********

SUB-AREA RUNOFF COMPUTATION

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME
1	0	0	0	0	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	40.78	0.	40.78	0.	0.	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.	17.50	94.00	108.00	118.00	126.00	0.	0.

TRSPC COMPUTED BY THE PROGRAM IS 0.844

LOSS DATA

STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0.	0.	1.00	0.	0.	1.00	1.00	0.10	0.	0.

UNIT HYDROGRAPH DATA
TP= 9.00 CP=0.63 NTA= 0

RECESSION DATA
STRTQ= 80.00 QRCSN= 80.00 RTIOR= 1.00
APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC= 5.19 AND R= 4.21 INTERVALS

UNIT HYDROGRAPH 26 END-OF-PERIOD ORDINATES. LAG= 9.00 HOURS, CP= 0.62 VOL= 1.00

167.	604.	1164.	1624.	1806.	1640.	1306.	1028.	810.	638.
502.	396.	312.	245.	193.	152.	120.	94.	74.	59.
46.	36.	29.	23.	18.	14.				

END-OF-PERIOD FLOW

TIME	RAIN	EXCS	COMP Q
1	0.01	0.	80.
2	0.01	0.	80.
3	0.01	0.	80.
4	0.05	0.	80.
5	0.05	0.	80.
[illegible]	[illegible]	[illegible]	80

10	0.02	0.	80.
11	0.02	0.	80.
12	0.02	0.	80.
13	0.20	0.	80.
14	0.20	0.	80.
15	0.20	0.	80.
16	0.69	0.49	162.
17	0.69	0.49	457.
18	0.69	0.49	1027.
19	3.61	3.41	2309.
20	7.36	7.16	5583.
21	2.92	2.72	11305.
22	0.30	0.10	17928.
23	0.30	0.10	23042.
24	0.30	0.10	24737.
25	0.	0.	22713.
26	0.	0.	18779.
27	0.	0.	14984.
28	0.	0.	11891.
29	0.	0.	9405.
30	0.	0.	7425.
31	0.	0.	5865.
32	0.	0.	4637.
33	0.	0.	3669.
34	0.	0.	2907.
35	0.	0.	2306.
36	0.	0.	1833.
37	0.	0.	1461.
38	0.	0.	1168.
39	0.	0.	937.
40	0.	0.	755.
41	0.	0.	611.
42	0.	0.	493.
43	0.	0.	400.
44	0.	0.	327.
45	0.	0.	237.
46	0.	0.	125.
47	0.	0.	85.
48	0.	0.	83.
49	0.	0.	81.
50	0.	0.	80.
51	0.	0.	80.
52	0.	0.	80.
53	0.	0.	80.
54	0.	0.	80.
55	0.	0.	80.
56	0.	0.	80.
57	0.	0.	80.
58	0.	0.	80.
59	0.	0.	80.
60	0.	0.	80.
61	0.	0.	80.
62	0.	0.	80.
63	0.	0.	80.
64	0.	0.	80.
65	0.	0.	80.
66	0.	0.	80.
67	0.	0.	80.

83	0.	0.	80.
84	0.	0.	80.
85	0.	0.	80.
86	0.	0.	80.
87	0.	0.	80.
88	0.	0.	80.
89	0.	0.	80.
90	0.	0.	80.
91	0.	0.	80.
92	0.	0.	80.
93	0.	0.	80.
94	0.	0.	80.
95	0.	0.	80.
96	0.	0.	80.
97	0.	0.	80.
98	0.	0.	80.
99	0.	0.	80.
100	0.	0.	80.
SUM	18.64	15.06	205007.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	24737.	23498.	14472.	5552.	205008.
INCHES		5.36	13.20	15.20	15.59
AC-FT		11658.	28719.	33056.	33903.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 1

40.	40.	40.	40.	40.	40.	40.	40.	40.	40.
40.	40.	40.	40.	40.	81.	229.	513.	1154.	2791.
5653.	8964.	11521.	12369.	11357.	9390.	7492.	5946.	4702.	3713.
2933.	2318.	1834.	1453.	1153.	917.	731.	584.	468.	377.
306.	247.	200.	163.	118.	62.	43.	42.	41.	40.
40.	40.	40.	40.	40.	40.	40.	40.	40.	40.
40.	40.	40.	40.	40.	40.	40.	40.	40.	40.
40.	40.	40.	40.	40.	40.	40.	40.	40.	40.
40.	40.	40.	40.	40.	40.	40.	40.	40.	40.
40.	40.	40.	40.	40.	40.	40.	40.	40.	40.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	12369.	11749.	7236.	2776.	102504.
INCHES		2.68	6.60	7.60	7.79
AC-FT		5829.	14359.	16528.	16952.

HYDROGRAPH AT STA . FOR PLAN 1, RTIO 2

80.	80.	80.	80.	80.	80.	80.	80.	80.	80.
80.	80.	80.	80.	80.	162.	457.	1027.	2309.	5583.
11305.	17928.	23042.	24737.	22713.	18779.	14984.	11891.	9405.	7425.
5865.	4637.	3669.	2907.	2306.	1833.	1461.	1168.	937.	755.
611.	493.	400.	327.	237.	125.	85.	83.	81.	80.
80.	80.	80.	80.	80.	80.	80.	80.	80.	80.
80.	80.	80.	80.	80.	80.	80.	80.	80.	80.
80.	80.	80.	80.	80.	80.	80.	80.	80.	80.
80.	80.	80.	80.	80.	80.	80.	80.	80.	80.
80.	80.	80.	80.	80.	80.	80.	80.	80.	80.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	24737.	23498.	14472.	5552.	205008.

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

HYDROGRAPH ROUTING

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME
1	1	0	0	0	0	1

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME
0.	0.	0.	1	1

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA
1	0	0	0.	0.	0.	20650.

STORAGE=	20650.	29875.	37077.	38813.	43369.	0.	0.	0.	0.	0.
OUTFLOW=	0.	0.	436.	942.	3592.	0.	0.	0.	0.	0.

STATION 1, PLAN 1, RTIO 1

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	41.	125.	190.	242.	281.
311.	334.	352.	365.	374.	381.	385.	388.	389.	389.
389.	388.	386.	384.	382.	379.	376.	372.	369.	366.
362.	359.	356.	353.	350.	347.	344.	341.	338.	335.
332.	329.	326.	323.	320.	317.	315.	312.	309.	307.
304.	301.	299.	296.	294.	291.	289.	286.	284.	281.
279.	276.	274.	272.	269.	267.	265.	263.	260.	258.
256.	254.	252.	250.	248.	246.	243.	241.	239.	237.

STOR

20657.	20663.	20670.	20676.	20683.	20690.	20696.	20703.	20710.	20716.
20723.	20729.	20736.	20743.	20749.	20759.	20785.	20846.	20984.	21310.
22008.	23216.	24909.	26883.	28844.	30555.	31937.	33021.	33865.	34518.
35018.	35398.	35685.	35898.	36052.	36161.	36233.	36278.	36301.	36307.
36299.	36280.	36253.	36220.	36179.	36132.	36078.	36023.	35969.	35915.
35861.	35808.	35755.	35704.	35652.	35601.	35551.	35501.	35451.	35402.
35354.	35306.	35258.	35211.	35165.	35119.	35073.	35028.	34983.	34939.
34895.	34852.	34809.	34766.	34724.	34682.	34641.	34600.	34560.	34520.
34480.	34441.	34402.	34363.	34325.	34288.	34250.	34213.	34177.	34140.
34104.	34069.	34034.	33999.	33964.	33930.	33896.	33863.	33830.	33797.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	389.	389.	385.	358.	23083.
INCHES		0.09	0.35	0.98	1.76
AC-FT		193.	763.	2132.	3817.

STATION 1, PLAN 1, RTIO 2

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	195.	430.	1759.	3147.	4091.	4692.	5034.
5181.	5188.	5093.	4927.	4714.	4472.	4213.	3947.	3681.	3421.
3170.	2930.	2702.	2488.	2285.	2092.	1910.	1742.	1590.	1452.
1326.	1212.	1108.	1013.	935.	895.	856.	820.	785.	752.
720.	690.	661.	634.	608.	583.	559.	537.	515.	495.
475.	457	439	423	430	426	423.	419.	416.	412.

39473.	39276.	39098.	38936.	38788.	38650.	38519.	38393.	38274.	38160.
38052.	37948.	37850.	37756.	37667.	37582.	37500.	37423.	37349.	37279.
37212.	37148.	37087.	37029.	36971.	36913.	36856.	36800.	36744.	36689.
36634.	36580.	36526.	36473.	36421.	36369.	36317.	36266.	36216.	36166.
36116.	36067.	36019.	35971.	35923.	35876.	35830.	35783.	35738.	35693.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	5188.	5154.	4603.	2676.	114176.
INCHES		1.18	4.20	7.33	8.68
AC-FT		2557.	9134.	15933.	18882.

********** ********** ********** ********** **********

PEAK FLOW SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS

OPERATION	STATION	PLAN	RATIOS APPLIED TO FLOWS 0.50	1.00
HYDROGRAPH AT	1	1	12369.	24737.
		2	0.	0.
ROUTED TO	1	1	389.	5188.
		2	0.	0.

APPENDIX E

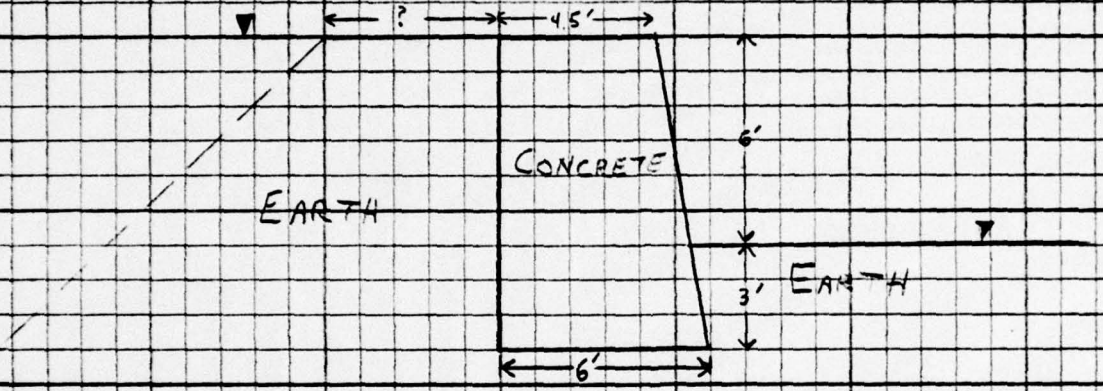
STRUCTURAL STABILITY COMPUTATIONS

GA-17 (4/70) NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

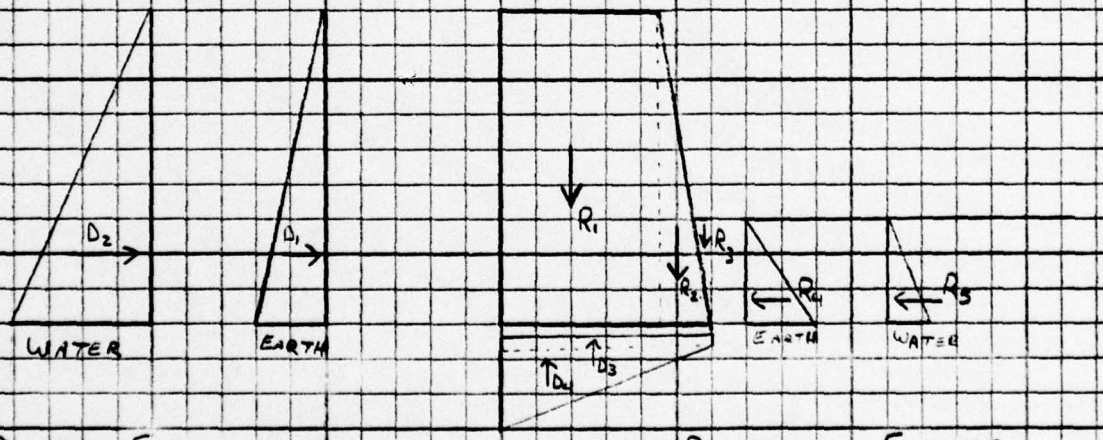
PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
BRANT LAKE UPPER DAM	1		
SUBJECT		**COMPUTED BY**	**DATE**
STABILITY ANALYSIS		RLW	1/15/79

CASE I NORMAL CONDITIONS



OVERTURNING



DRIVING FORCES

$D_1 = \frac{1}{2}(55)(.33)(9)^2 = 735$

$D_2 = \frac{1}{2}(62.4)(9)^2 = 2527$

$D_3 = (62.4)(3)(6) = 1123$

$D_4 = \frac{1}{2}(6)[(62.4)(9) - (62.4)(3)] = 1123$

RESISTING FORCES

$R_1 = (4.5)(9)(150) = 6075$

$R_2 = \frac{1}{2}(1.5)(9)(150) = 1012$

$R_3 = \frac{1}{2}(.5)(3)(55) = 41.3$

$R_4 = \frac{1}{2}(55)(3.0)(3)^2 = 742$

$R_5 = \frac{1}{2}(62.4)(3)^2 = 281$

GA-17 (4/70) NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
BRANT LAKE UPPER DAM	2		
SUBJECT		**COMPUTED BY**	**DATE**
STABILITY ANALYSIS		RLW	1/15/79

CASE 1 (CONT)

DRIVING MOMENTS

$2527(3) + 735(3) + (1123)(3) + (1123)(4) = 17647$

RESISTING MOMENTS

$6075(3.75) + 1012(1) + 742(1) + 281(1) + 41.3(.17) = 24823$

$$F.S. = \frac{24823}{17647} = 1.41$$

SLIDING

DRIVING FORCES

$2527 + 735 = 3262$

RESISTING FORCES

$$281 + 742 + .5\left[(6075 + 1012 + 41.3) - \left(\frac{562 + 188}{2}\right)6\right] = 3462$$

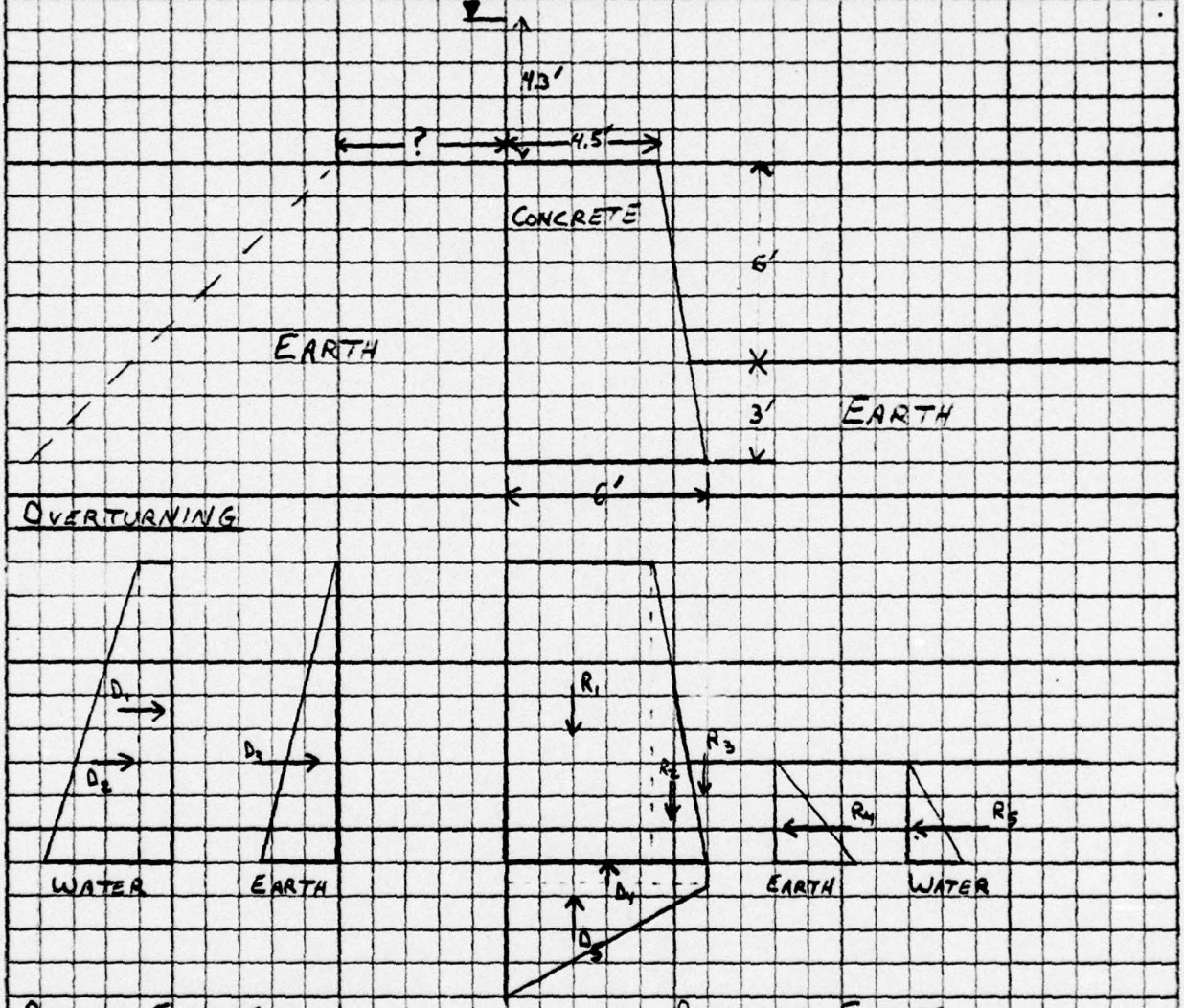
$$F.S. = \frac{3462}{3262} = 1.06$$

GA-17 (4/70) NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
GRANT LAKE UPPER DAM	3		
SUBJECT		**COMPUTED BY**	**DATE**
STABILITY ANALYSIS		RLW	1/16/79

CASE 2 ½ PMF FLOWING OVER SPILLWAY



OVERTURNING

DRIVING FORCES

$D_1 = (4.3)(62.4)(9) = 2415$

$D_2 = \frac{1}{2}(62.4)(9)^2 = 2527$

$D_3 = \frac{1}{2}(55)(.33)(9)^2 = 735$

$D_4 = (62.4)(3)(6) = 1123$

$D_5 = \frac{1}{2}(6)(62.4)[13.3 - 3] = 1928$

RESISTING FORCES

$R_1 = 4.5(9)(150) = 6075$

$R_2 = \frac{1}{2}(1.5)(9)(150) = 1012$

$R_3 = \frac{1}{2}(.5)(3)(55) = 41.3$

$R_4 = \frac{1}{2}(55)(3.0)(3)^2 = 742$

$R_5 = \frac{1}{2}(62.4)(3)^2 = 281$

GA-17 (4/70) NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
GRANT LAKE UPPER DAM.	4		
SUBJECT		**COMPUTED BY**	**DATE**
STABILITY ANALYSIS		RLW	1/16/79

CASE 2 (CONT.)

DRIVING MOMENTS

$2415(4.5) + 2527(3) + 735(3) + 1123(3) + 1928(4) = 31735$

RESISTING MOMENTS

$6075(3.75) + 1012(1) + 742(1) + 281(1) + (41.3)(57) = 24823$

$$F.S. = \frac{24823}{31735} = .78$$

SLIDING

DRIVING FORCES

$2527 + 2415 + 735 = 5677$

RESISTING FORCES

$$281 + 742 + .5\left[(6075 + 1012 + 413) - \left(\frac{834 + 488}{2}\right)6\right] = 3059$$

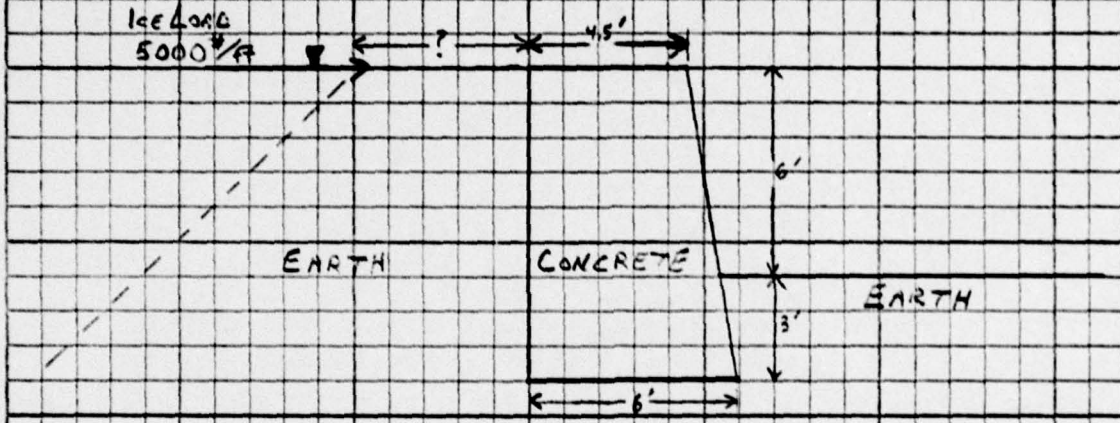
$$F.S. = \frac{3059}{5677} = .53$$

GA-17 (4/70) NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

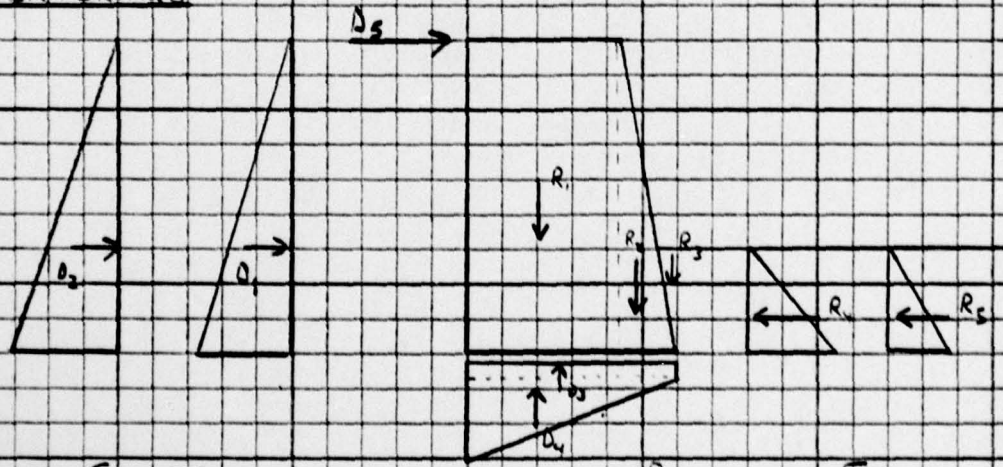
PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
BRANT LAKE UPPER DAM	5		
SUBJECT		**COMPUTED BY**	**DATE**
STABILITY ANALYSIS		RLW	1/16/79

CASE 3 NORMAL WATER LEVEL WITH ICE LOAD



OVERTURNING



DRIVING FORCES

$D_1 = \frac{1}{2}(55)(.33)(9)^2 = 735$

$D_2 = \frac{1}{2}(62.4)(9)^2 = 2527$

$D_3 = (62.4)(3)(6) = 1123$

$D_4 = \frac{1}{2}(6)(62.4)[9-3] = 1123$

$D_5 = 5000$

RESISTING FORCES

$R_1 = (4.5)(9)(150) = 6075$

$R_2 = \frac{1}{2}(1.5)(9)(150) = 1012$

$R_3 = \frac{1}{2}(.5)(3)(55) = 41.3$

$R_4 = \frac{1}{2}(55)(3.0)(3)^2 = 742$

$R_5 = \frac{1}{2}(62.4)(3)^2 = 281$

GA-17 (4/70) NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT GRID

JOB	SHEET NO.	CHECKED BY	DATE
BRANT LAKE UPPER DAM	6		
SUBJECT		**COMPUTED BY**	**DATE**
STABILITY ANALYSIS		RLW	1/16/79

CASE 3 (CONT.)

DRIVING MOMENTS

$2527(3) + 735(3) + 5000(4) + 1123(3) + 1123(4) = 62647$

RESISTING MOMENTS

$6075(3.75) + 1012(1) + 742(11) + 281(1) + 41.3(.17) = 24823$

$$F.S. = \frac{24823}{62647} = .40$$

SLIDING

DRIVING FORCES

$2527 + 735 + 5000 = 8262$

RESISTING FORCES

$$281 + 742 + .5\left[6075 + 1012 + 41.3 - \left(\frac{562 + 188}{2}\right)6\right] = 3462$$

$$F.S. = \frac{3462}{8262} = .42$$

APPENDIX F

LIST OF REFERENCES

APPENDIX F

REFERENCES

1) U.S. Department of Commerce, Technical Paper No. 40, Rainfall Frequency Atlas of the United States, May 1961.

2) H.W. King and E.F. Brater, Handbook of Hydraulics, 5th edition, McGraw-Hill, 1963.

3) University of the State of New York, Geology of New York, Education Leaflet 20, Reprinted 1973.

4) Elwyn E. Seelye, Design, 3rd edition, John Wiley and Sons, Inc., 1960

APPENDIX G

DRAWINGS

VICINITY MAP
BRANT LAKE UPPER DAM

TOPOGRAPHIC MAP
BRANT LAKE UPPER DAM

222 A

Wes June 20-16 see 047 WT rep

FORM IWoL 6-15-12 2000 (16 [illegible])

(NOTICE: After filling out one of these forms as completely as possible for each dam in your district, return it at once to the Conservation Commission, Albany.)

STATE OF NEW YORK

CONSERVATION COMMISSION

ALBANY

DAM REPORT

Aug 13, 1913
(Date)

CONSERVATION COMMISSION,

DIVISION OF INLAND WATERS.

GENTLEMEN:

I have the honor to make the following report in relation to the structure known as the ..... Dam.

This dam is situated upon the outlet of Brant Lake
(Give name of stream)
in the Town of Horicon, Warren County,
about one (State distance) from the Village ~~or City~~ of Horicon.
The distance (Up or down) stream from the dam, ~~to the~~ at the bridge
(Give name of nearest important stream or of a bridge)
is about ..... (State distance).

The dam is now owned by Brant Lake Conservation
(Give name in full)
and was built in or about the year 1907, and was extensively repaired or reconstructed during the year .....

As it now stands, the spillway portion of this dam is built of concrete
(State whether of masonry, concrete or timber)
and the other portions are built of masonry
(State whether of masonry, concrete, earth or timber with or without rock fill)

As nearly as I can learn, the character of the foundation bed under the spillway portion of the dam is gravel & stone and under the remaining portions such foundation bed is " " .

The total length of this dam is ~40 feet. The spillway or waste-weir portion, is about 16 feet long, and the crest of the spillway is about 3 1/2 feet below the top of the dam.

The number, size and location of discharge pipes, waste pipes or gates which may be used for drawing off the water from behind the dam, are as follows: .....

.....

State briefly, in the space below, whether, in your judgment, this dam is in good condition, or bad condition, describing particularly any leaks or cracks which you may have observed.)

Good condition

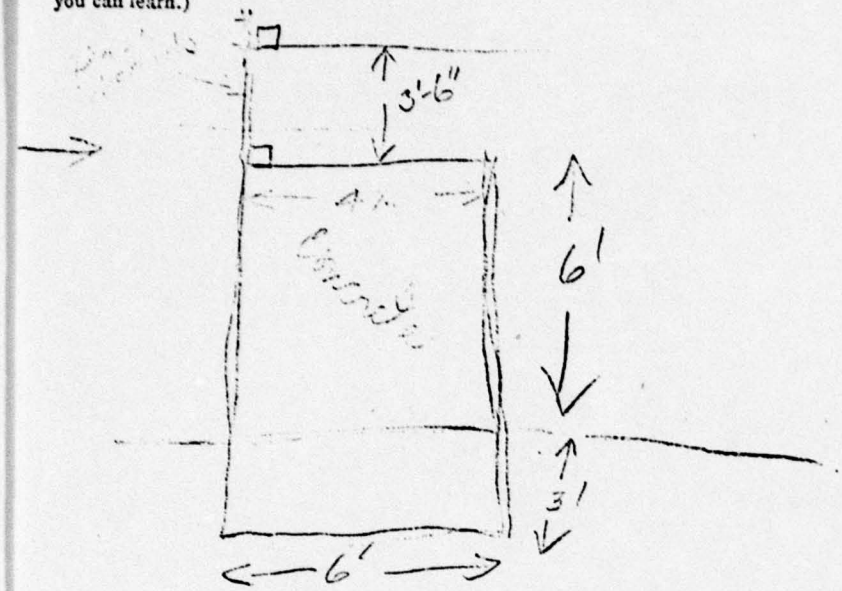
Reported by L. A. Ervin
(Signature)

.....
(Address—Street and number, P. O. Box or R. F. D. route)

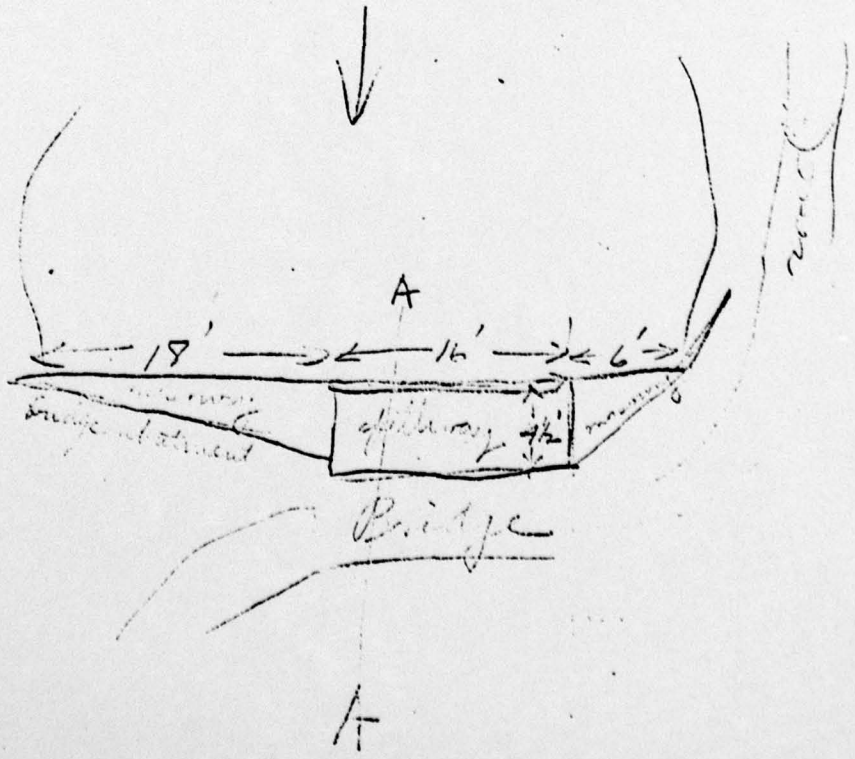
.....
(Name of place)

(SEE OTHER SIDE)

(In the space below, make one sketch showing the form and dimensions of a cross section through the spillway or waste-weir of this dam, and a second sketch showing the same information for a cross section through the other portion of the dam. Show particularly the greatest height of the dam above the stream bed, its thickness at the top, and thickness at the bottom, as nearly as you can learn.)



(In the space below, make a third sketch showing the general plan of the dam, and its approximate position in relation to buildings or other conspicuous objects in the vicinity.



Form W31. 5-12-16-2000 (16-10738) Acc. 382

(NOTICE: After filling out one of these forms as completely as possible for each dam in your district, return it at once to the Conservation Commission, Albany.)

STATE OF NEW YORK
CONSERVATION COMMISSION
ALBANY

DAM REPORT

S-222-No 652 Upper Hudson

July 16 (Date), 1920

CONSERVATION COMMISSION,

DIVISION OF WATERS.

GENTLEMEN:

I have the honor to make the following report in relation to the structure known as the Brant Lake Upper Dam.

This dam is situated upon the ..... (Give name of stream)

in the Town of Chester ?, Warren County,

about ¼ mile (State distance) from the Village or City of Harrisburg

The distance up (Up or down) stream from the dam, to the Brant Lake (Give name of nearest important stream or of a bridge),

is about ¼ mile (State distance)

The dam is now owned by Brant Lake Association Harrisburg NY (Give name and address in full)

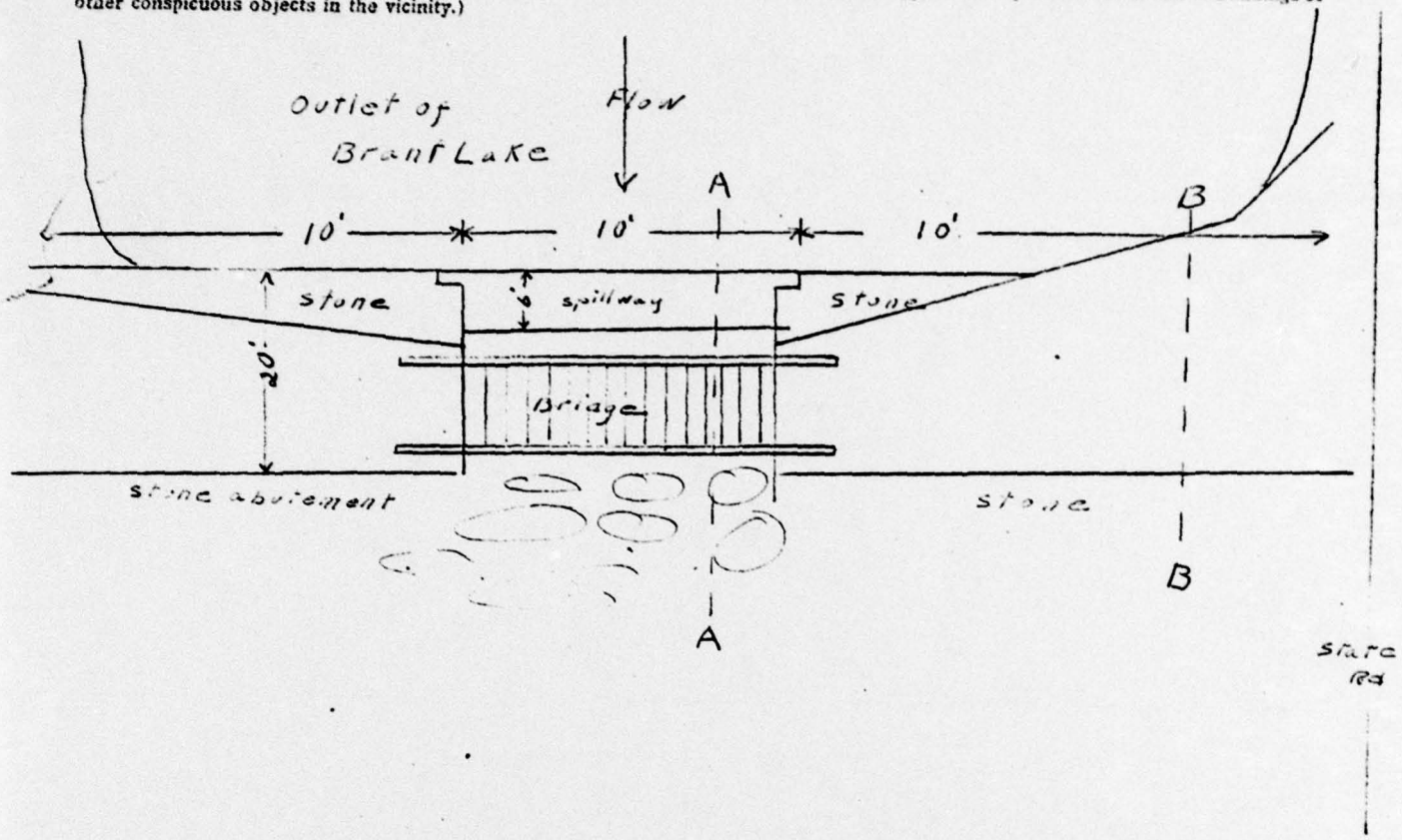
and was built in or about the year 1908, and was extensively repaired or reconstructed during the year —— and is used for: supply power to mill below maintaining Lake level

As it now stands, the spillway portion of this dam is built of Concrete (State whether of masonry, concrete or timber)

and the other portions are built of Concrete & stone (State whether of masonry, concrete, earth or timber with or without rock fill)

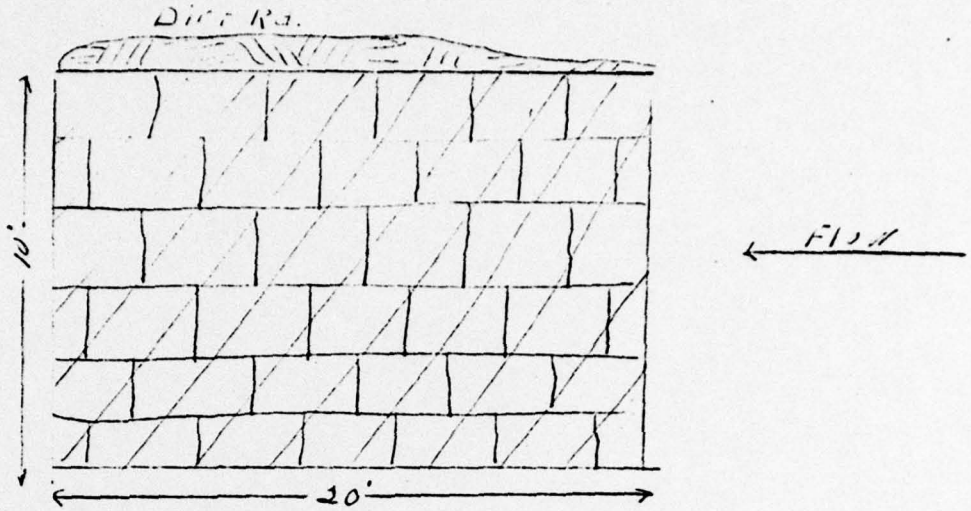
As nearly as I can learn, the character of the foundation bed under the spillway portion of the dam is Gravel and under the remaining portions such foundation bed is "

(In the space below, make a third sketch showing the general plan of the dam, and its approximate 'position in relation to buildings or other conspicuous objects in the vicinity.)

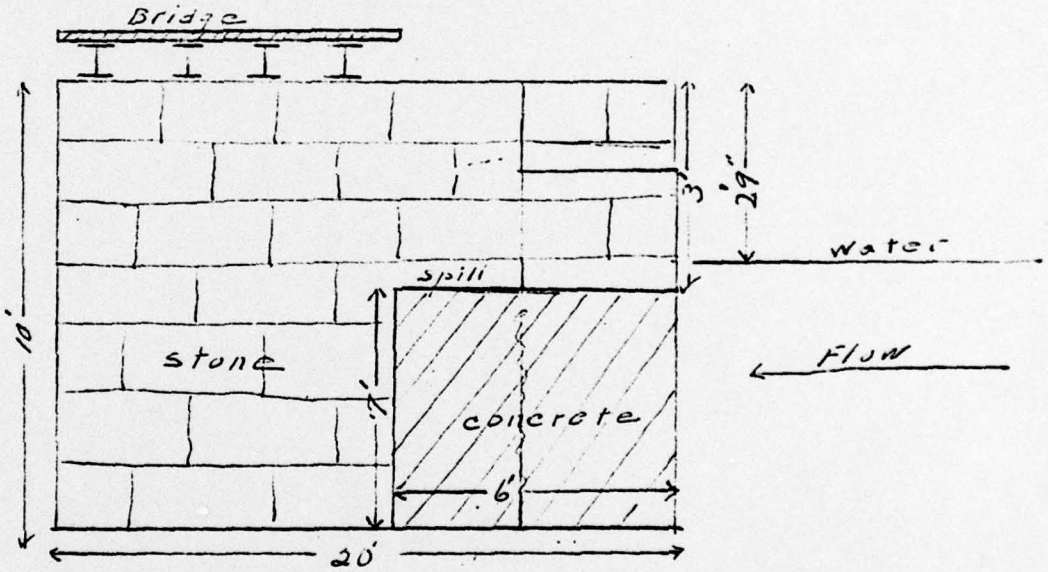


(In the space below, make one sketch showing the form and dimensions of a cross section through the spillway or waste-weir of this dam and outline the abutment, and a second sketch showing the same information for a cross section through the other portion of the dam. Show particularly the greatest height of the dam above the stream bed, its thickness at the top, and thickness at the bottom, as nearly as you can learn.)

Section BB



Section AA



The total length of this dam is 30' feet. The spillway or waste-weir portion, is about 12' feet long, and the crest of the spillway is about 3 feet below the abutment.

The number, size and location of discharge pipes, waste pipes or gates which may be used for drawing off the water from behind the dam, are as follows: Two spillway pipes 4" dia. at 1'

At the time of this inspection the water level above the dam was ft. 2 in. ~~be-~~ above the crest of the spillway.

(State briefly, in the space below, whether, in your judgment, this dam is in good condition, or bad condition, describing particularly any leaks or cracks or erosions which you may have observed.)

Dam is in good condition; no leaks.
Present no danger of dam going out.

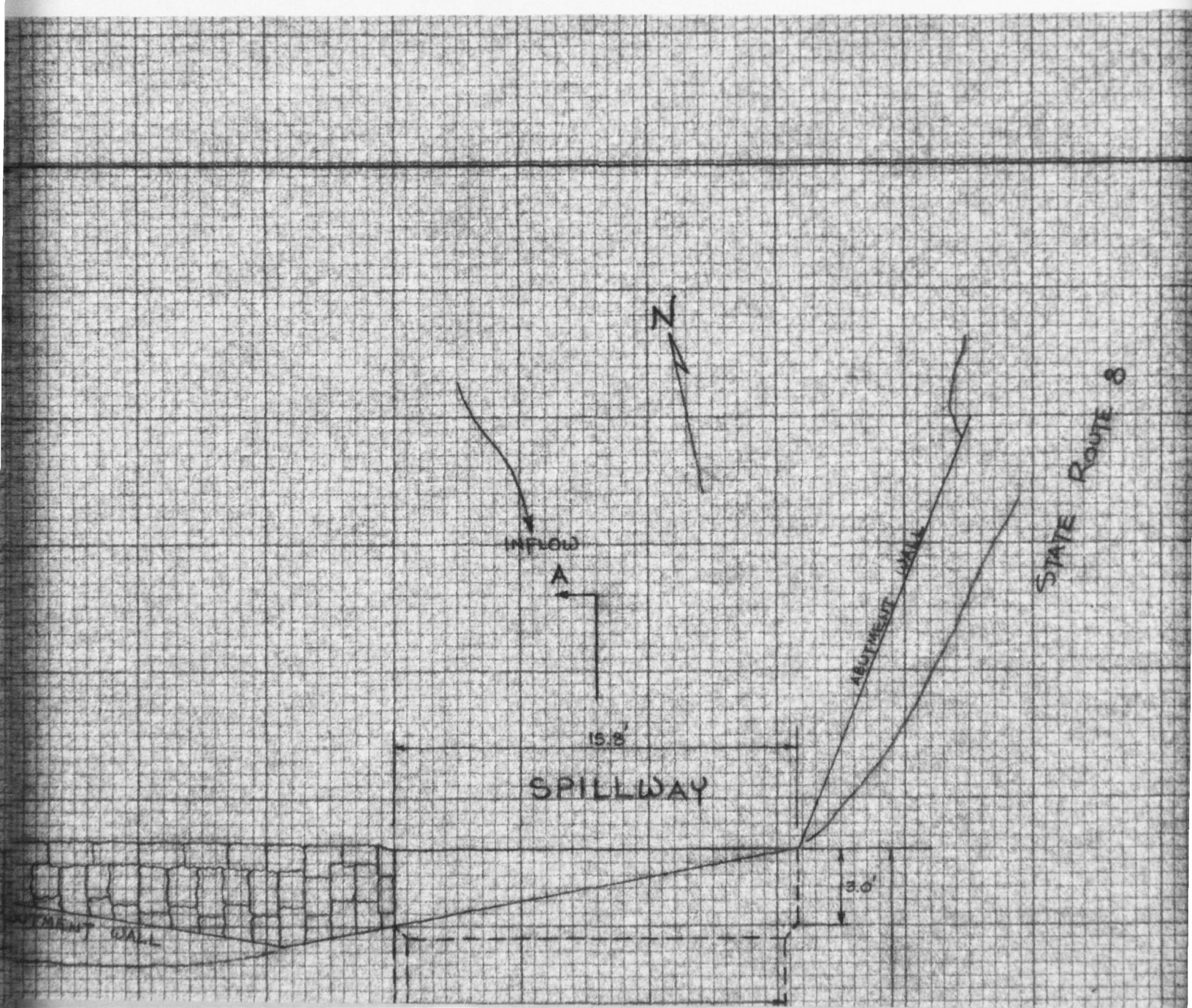
Reported by Richard T. Crane
(Signature)

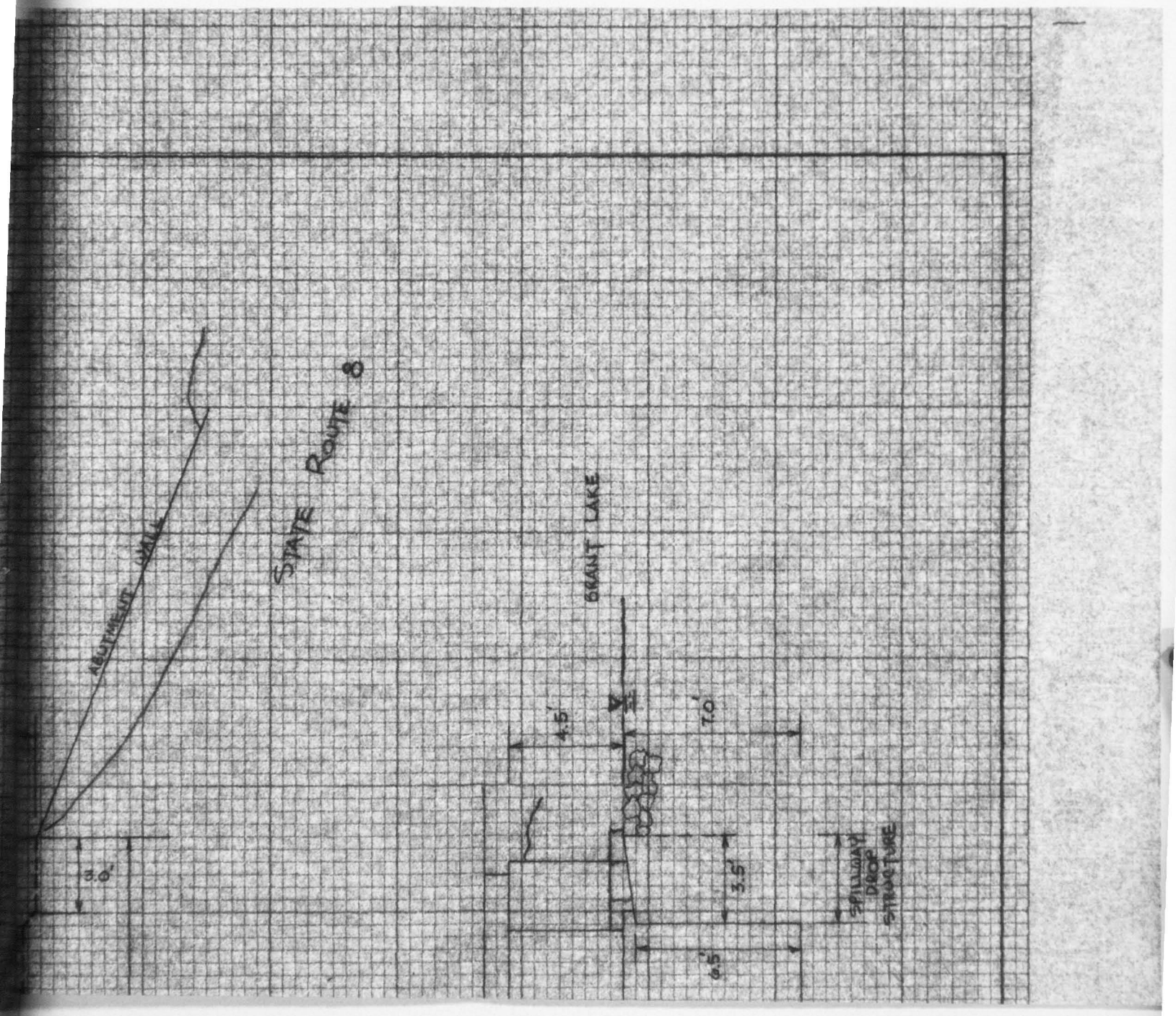
Route 40 Park, N.Y.
(Address—Street and number, P. O. Box or R. F. D. route)

(Name of place)

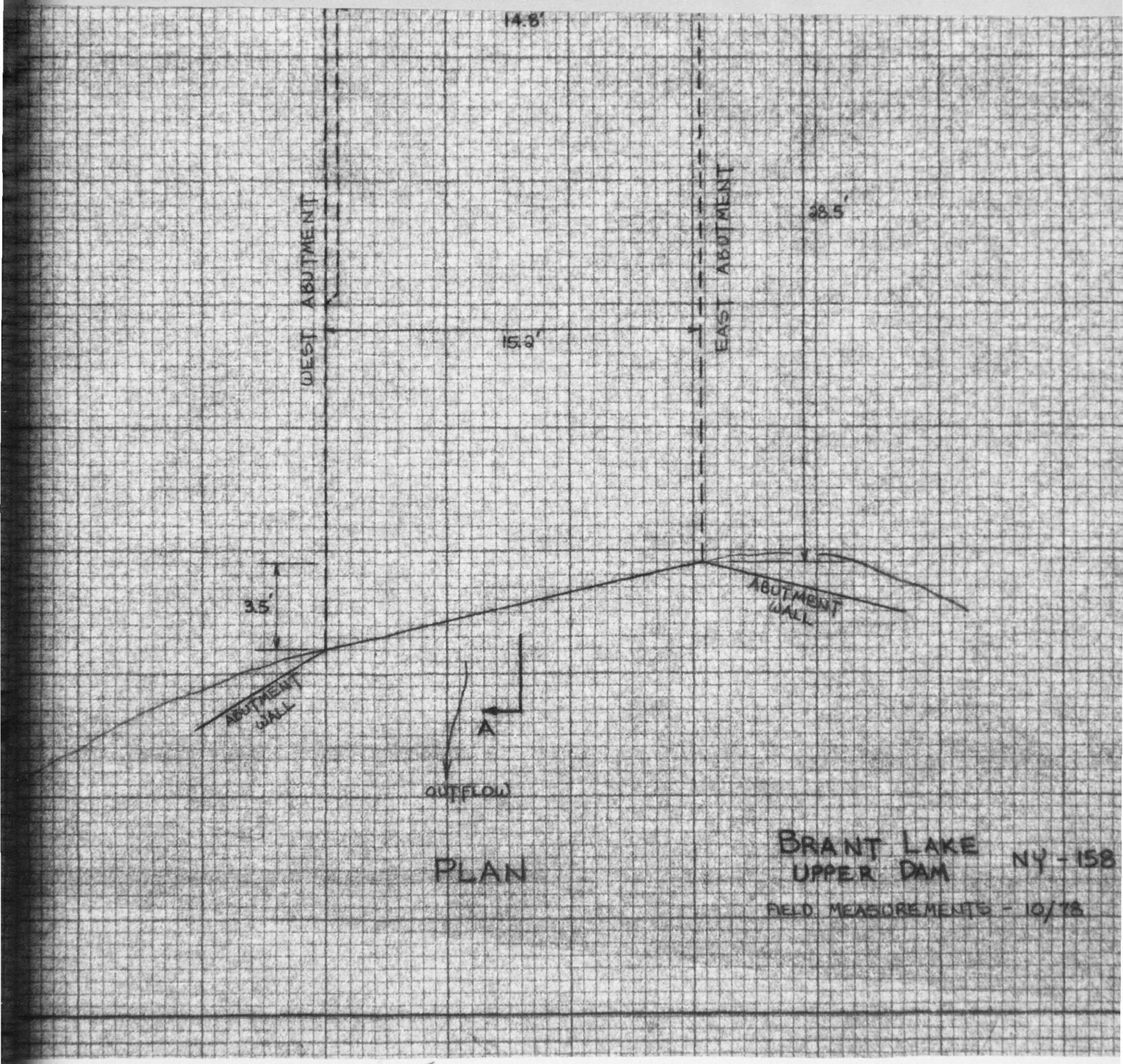
ABUTMENT WALL

2


N
INFLOW
A
15.8'
SPILLWAY
ABUTMENT WALL
STATE ROUTE 90
3.0'
ABUTMENT WALL


ABUTMENT WALL
STATE ROUTE 8
GRANT LAKE
4.5'
7.0'
3.5'
6.5'
SPILLWAY DROP STRUCTURE

Rod Speed - #7



PLAN

BRANT LAKE NY-158
UPPER DAM

FIELD MEASUREMENTS - 10/78

SECTION A-A
WEST ABUTMENT
BRIDGE DECK & BEAMS
BOTTOM OF BRIDGE BEAMS
ABUTMENT WALL
TAILWATER
TO BRANT LAKE LOCK & DAM
38.5'
BRANT LAKE
UPPER DAM
NY-158
FIELD MEASUREMENTS - 10/78